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CHICAGO SHOWS, Sept. 6-17

AUGUST, 1955

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

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"your future dividends"

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MILLING SILVER INSERTS

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BPA

BALAS COLLETS

FOR ALL MACHINES

Guaranteed not to pull off at the threads,

Now you can get Balas Collets for all your machines guaranteed not to pull off at the threads! We can make this unusual offer because of our special design, our precision manufacturing and rigid inspection.

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Illustrated at the left is a 1¼" Balas Collet. Note the design and manufacturing quality. At the right is another brand of collet. See how the threads have been pulled off the body. Imagine the damage that was caused, the time lost in removing the thread from the tube and replacing a new collet.

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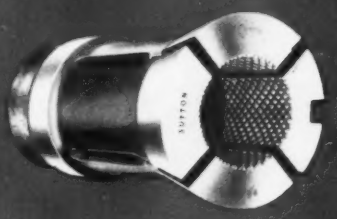
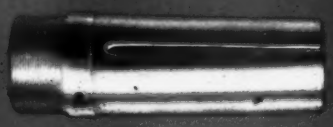


Standard collet for ACME-GRIDLEY, CONE, NEW BRITAIN GRIDLEY, and WARNER & SWASEY AUTOMATIC BAR MACHINES.



Style "L" master feeder with interchangeable and replaceable pads.

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TURRET LATHES

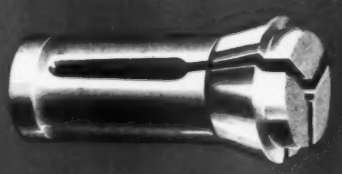
STANDARD COLLETS; MASTER COLLETS AND PADS

LATHES AND MILLING MACHINES

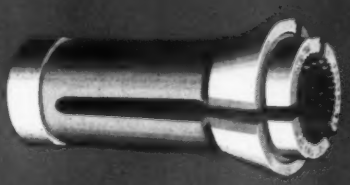
COLLETS FOR ALL MAKES OF LATHES AND MILLING MACHINES

SPECIAL

COLLETS; TOOLS; CHUCK JAWS; WORK-HOLDING DEVICES



Standard collet for BROWN & SHARPE AUTOMATICS.



Standard collet for 4 and 6 spindle GREENLEE AUTOMATIC BAR MACHINES.

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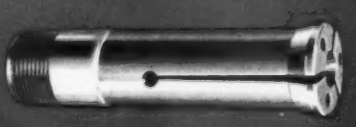

Standard collet for DAVENPORT AUTOMATIC BAR MACHINES.

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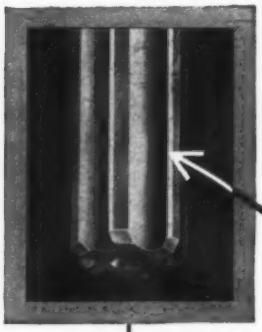

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The Magazine of Manufacturing Management

formerly Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-1951

George J. Huebner, Founder

VOL. XXI—No. 5 AUGUST, 1955

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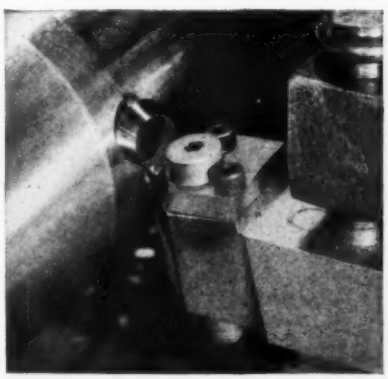

New Exclusive V-R solid cast alloy chipbreaker plate eliminates all ground-in chipbreakers. V-R Toolholders are available with either a standard chipbreaker plate or blank chipbreaker plate that can be easily modified using any grinding wheel.

"They saved us $358.50 a week on one job."

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	Purchase Price	Grinding Cost	5 Work Pieces Per Edge	Tool Cost per Finished Work Piece	Tool Cost for 750 Parts Per Week
Brazed Tool	$6.11 (1 Cutting Edge)	$4.56 (3 Regrinds)	20 Work Pieces	53¢	$397.50
"Throw-Away" Blanks	$1.58 (6 Cutting Edges)	No Grinding Needed	30 Work Pieces	.052	$39.00
			"Throw-Away" Blanks SAVE		$358.50 a week

An Eastern aircraft engine plant.

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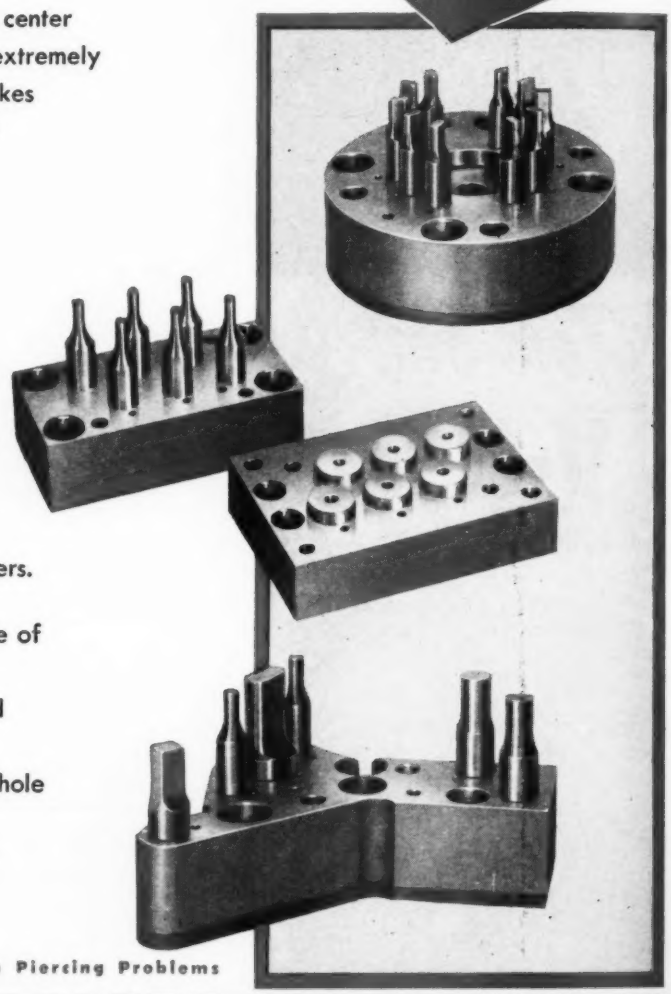

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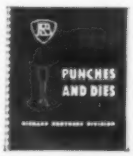

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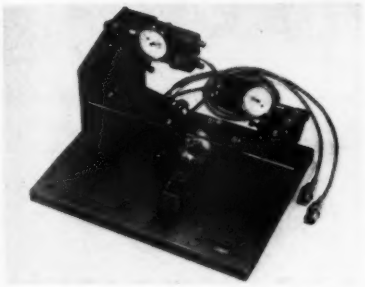
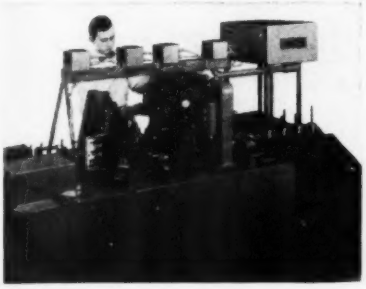
FOR ANYTHING IN MODERN GAGES

Automatic Gages



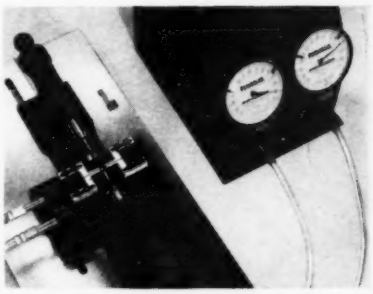
Gage continuously checks width and thickness of square wire travelling seventy feet a minute.



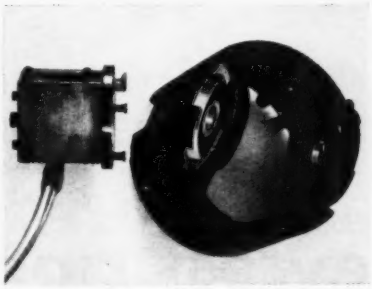
In-Process Gage measures twenty separate dimensions on thirteen different sizes of fabricated stator blades. Discards off-sizes.

Automatic Sorting Gage sorts valve stems for length, diameter, head thickness, hardness, out-of-round, and taper — at 2400 per hour.

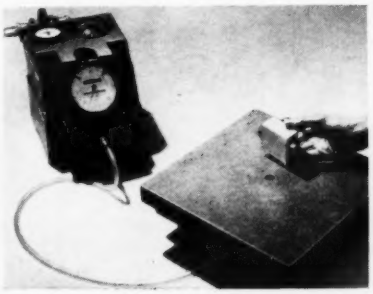
Air Gages



The amount of taper on a small shaft is determined by two 5,000 to 1 Dimensionairs with AirProbes. Measurements are in increments of .000020".

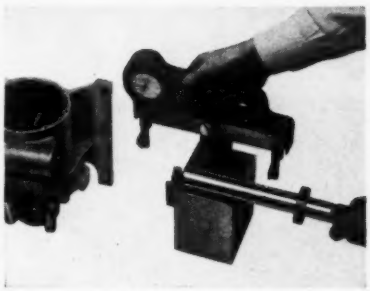


Dimensionair Gage measures a very shallow inside diameter. Frictionless motion-transfer unit contacts AirProbe which takes actual measurement.

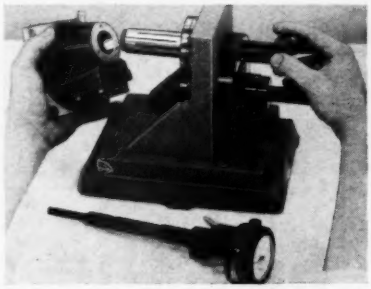


Air-Flatness Gage. AirProbe projects from black granite surface plate. Accurate to .000050" in any 2 x 2 ft. area.

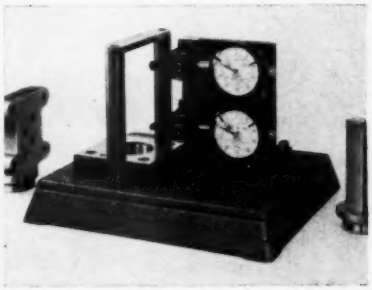
Mechanical Gages



Indicator Gage checks squareness of horizontal bores in relation to vertical bores. Gage shown is being applied to master.



Parallelism of the two lower holes with the large hole, and with each other, is checked on this specially designed fixture.



Dual-purpose Indicating Gage shows (1) squareness of face with flange and (2) distance from centerline to edge of face. Barrier protects contacts.

Whatever your gaging requirements, it pays to check with Federal.

RETURN THE COUPON TODAY!

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Company.....

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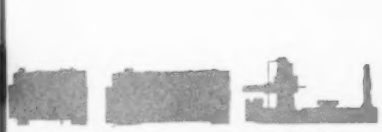

BOOTH 1419

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
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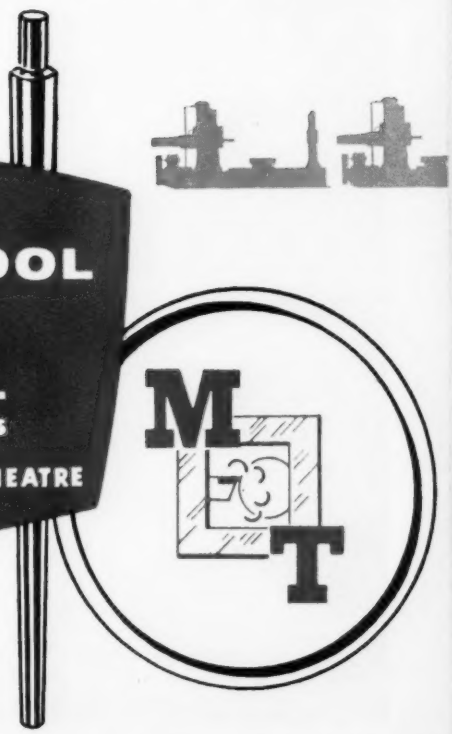

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

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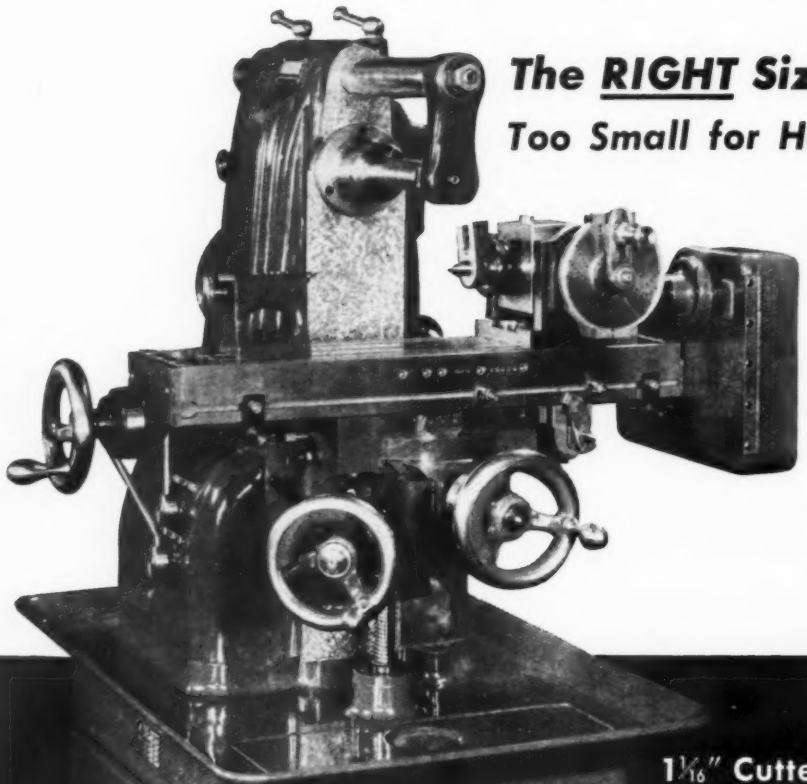

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Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★

DEVELOPING SUPERVISION THROUGH COST CONTROL*

by Donald H. Sunderlin
Managing Partner
SUNDERLIN ORGANIZATION
Management Engineers
Cleveland, Ohio

A RECENT SURVEY made by Dr. C. H. Lawshe, Consulting Psychologist of Purdue University, concludes that "management should pay more attention to the development of a broader, more enlightened management-mindedness in its foremen."

My purpose in addressing you today is to present a training procedure which not only gives management's perspective to supervision but saves upwards of a half million dollars per year in companies with 500 employees.

An indication of the adverse trend of foreman thinking may be gained from another survey undertaken jointly by the Foremanship Foundation and The Public Opinion Index for Industry. This survey revealed that:

"Ground has been lost in the past two years on the critical issue of how foremen regard their own management status."

"Currently one foreman in three either sees himself as a rank-and-file worker, or in between management and workers."

"With capital formation totaling more than $180 billion since World War II, less than half of foremen say they have received special training since becoming foremen."

"Rather than resort to law to settle the status of foremen, the matter calls for continued management action that demonstrates that foremen should be part of management."

*Adapted from a talk given by Mr. Sunderlin before a recent Management Seminar conducted in Chicago by the American Management Association.

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in a complete line of cutting tools

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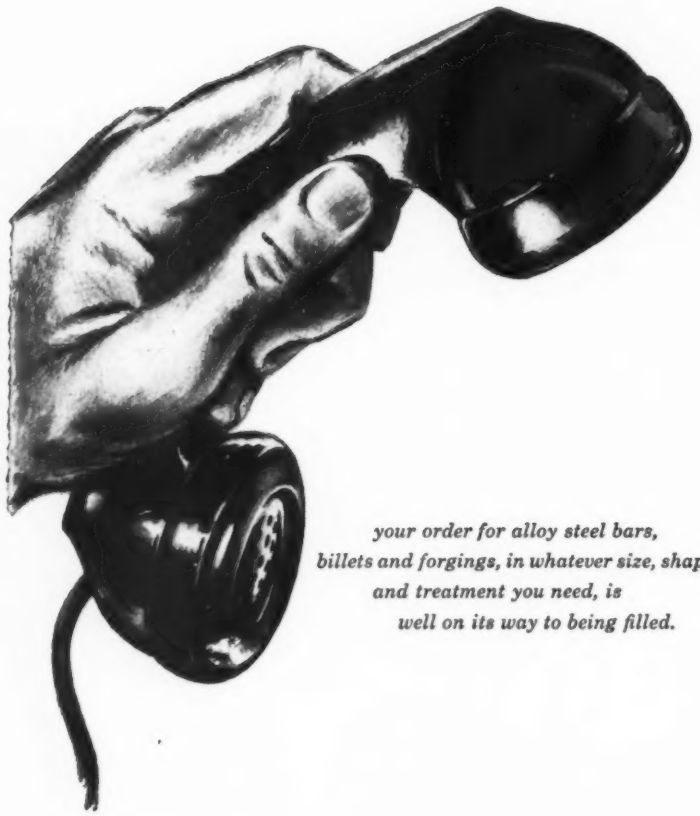

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CIRCLE INFORM-A-GRAM KEY NO. 12

The findings of both surveys indicate that constructive action is overdue. The situation is not improving. The law alone cannot be relied upon to effect management's objectives for that approach neither nurtures a favorable attitude nor unleashes latent ingenuity and energy. Without these qualities foremanship becomes sterile and static.

Basic Wants

How are men made strong and how is their unswerving loyalty won? In principle, men are strengthened and welded into a cohesive management team by supplying the basic wants common to all normal individuals with leadership ability:

A foreman must know what his job is. His responsibilities, the area in which he is to operate, and the limits of his authority must be clearly understood.

A foreman must know how he is measuring up. In terms of a realistic par, he must know how his performance compares with what is expected of him.

A foreman must have protection. Help must be available from his superior in solving problems beyond his ability. Support must be forthcoming when a correct decision of his is questioned by subordinates. His superior must merit his respect and their personal relationships must be pleasant.

A foreman must have opportunity for growth. The road ahead must open up when capacity for greater responsibility has been demonstrated.

A foreman must know the rules of the game and understand that the regulations are meant for the greatest good of the greatest number.

A foreman must be supplied with information designed to help him control his operations, while it is fresh or hot.

A foreman must be given a cause to fight for. Only when his labors abet the attainment of an ideal, does he give unstintingly of himself.

Approved Administrative Practices

Bringing this discussion directly to bear on foremanship, what are the tools and techniques good Management used to motivate the foremen and win their loyalty?

Operating standards are used to indicate how closely he is approaching cost par, production, schedule, quality specifications, etc.

. . . *Continued on page 16*

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Month's Talk, from page 12

A sound plan of organization is used to indicate his place on the team and his relationship to every other person who comes within his orbit.

Communications beamed in three directions are used; downward to appraise him of management's plans, upward to inform management of his reactions, and laterally to coordinate the efforts of all on his same organizational level.

Lines of promotion are used to indicate the jobs to which he can aspire.

Training is used to help him do his job better or to fit him for a more responsible job. Courses include economics and other keystones of free enterprise in a land where ideals and religion are held dear.

Job evaluation is used to determine a fair salary for his job.

Merit rating is used to compensate him for his performance on his job.

Incentives of various kinds are used to induce him to do his best.

Analysis is used to determine where his efforts should be concentrated to improve his productivity.

Social activities are used to cement personal relationships within the supervisory force.

Reports are used to tell him how he is spending the company's money and the value he is receiving for it.

Inspirational talks are used to raise his horizons and re-establish the fact that the building of men is every company's first objective. The automobiles, cameras, radios or refrigerators are incidental. A well organized team can produce any commodity and sell it at a profit or attain any other objective set forth in the corporation's charter.

Finally, the defense of the country, the preservation of free enterprise, the welfare of the team, and the raising of the standard of living are held up as causes transcending even the making of profits or the interests of the individual. Like the main spring, the wheels, and the escapement of a watch, everyone of these tools and techniques is directly or indirectly utilized in the Cost Control Plan which is the subject of this discussion.

. . . Continued on page 18

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5 Do you get less tool life than normal?	☐	☐
6 Do you run into assembly problems due to poor quality stampings?	☐	☐
7 Do you ever have costly delays due to poor delivery on stampings?	☐	☐
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CIRCLE INFORM-A-GRAM KEY NO. 18

Month's Talk, from page 16

Foremen Carry Major Responsibility

When we think of a foreman's job in terms of making a profit instead of organizing, planning, directing, coordinating and controlling, it gives us a more tangible measure by which to gage his responsibility. Shall we take a moment to see just how important a foreman's job really is in terms of the resources his employer entrusts to him?

As managers of their employers' funds, today's foremen have extremely responsible jobs. In one typical metalworking company with a proprietary product, the amount of money over which each of the various foremen has custody greatly exceeds $600,000 per year. Such a figure also applies to many jobbing shops producing for automotive, home appliance, and aviation industries. Included in this sum are the payrolls for direct and indirect labor, and the cost of such expense items as scrap, factory supplies, and cutting tools. Disregarded are capital investment, which could easily reach $150,000 per foreman, and all other costs beyond his immediate control.

Conventional Tools Were Found Inadequate

To help give the foreman a rein of some kind over these large expenditures mentioned earlier, it is common to supply them with budgets of one kind or another for the control of cost, and to use wage incentives to stimulate high production. The fact that red variances continue to show up on the budget statements indicates that this form of control is, at best, only partially effective. The reasons for this condition will be discussed in detail later. For the moment may I suggest that incentives are of far greater value to management when they are used for control purposes, for finding and removing the causes of sub-standard performance, than when their use is limited to increasing the productivity of labor.

Utilizing the Principles of Free Enterprise

In an economy such as ours the hope of profit, the pride of accomplishment, and the fear of

. . . *Continued on page 20*

CIRCLE INFORM-A-GRAM KEY NO. 19

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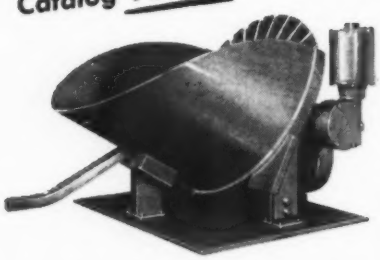

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CIRCLE INFORM-A-GRAM KEY NO. 20

Month's Talk, from page 18

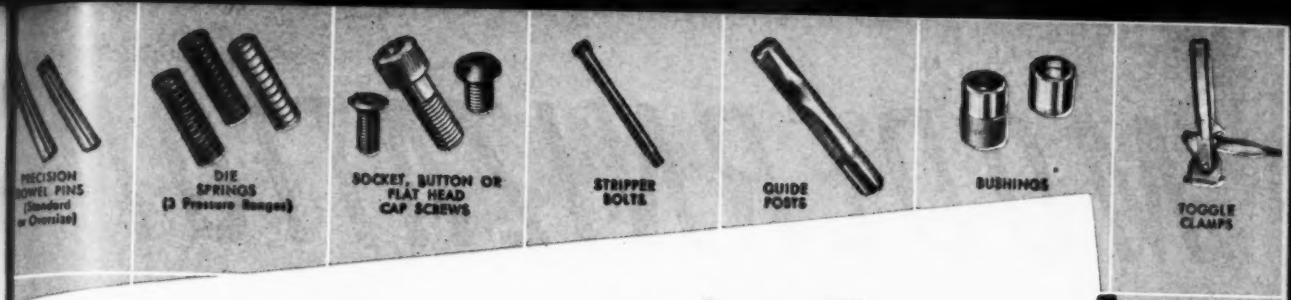
failure are usually foremost among the several motivations of the entrepreneurs. However, these quickeners of the spirit are not limited to the captains of industry; they also provide the spark which ignites the energies of the smaller counterparts of the big operators. When we take this page from the free enterprise book and offer the foreman similar motivations, they immediately cease to be up-graded workmen with a flair for leadership. Instead of being merely a buffer between organized labor on the one side and management on the other, with an understandable concern for their own skins, they become managers of their departments; proprietors of their own businesses, if you like. All of their resources: energy, judgment, initiative, are devoted to the attainment of management's goals because their personal welfare is linked so closely to operating results.

Now, give them a form of P and L statement, tailored to their needs, and they have a measurement of their managerial ability together with the financial inducement to make the maximal profit on their operations. By 9:30 this morning give them an analysis of yesterday's losses and you create a situation quite different from the usual laissez-faire; a new kind of foremanship. Gone is the tight rope walker attempting to keep his balance while management pulls him in one direction and labor pulls him in another. In his place is a junior edition of the manufacturing vice president. You then find an entirely different attitude which manifests itself in the directional flow of the pressure for improvement. It then stems from them upward to top management rather than from the top downward to them. "Don't talk to me, I only work here," and "let George do it" are discarded and in their place you hear "You're damned well right I'm the boss."

The Usual Approach, Per Se, Is Not Enough

Many companies have long had flexible budgets and wage incentives to induce the direct workers to work in conformance

. . . Continued on page 24



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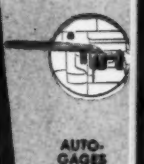

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CIRCLE INFORM-A-GRAM KEY NO. 22

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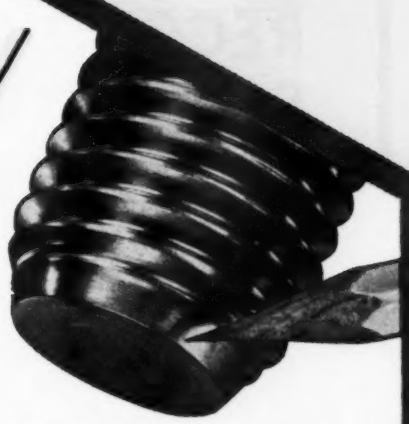

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NEW!

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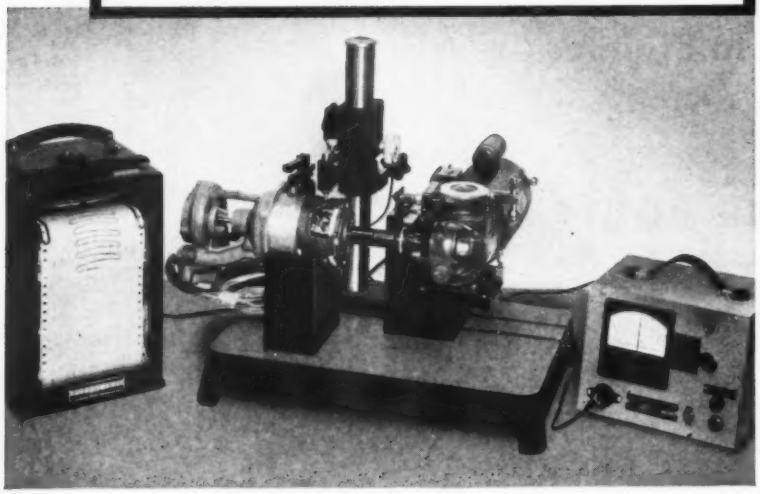

GIVES *CHART RECORD* of runout of rotating parts in assembled units. Two sensitivities are provided — .000010" and .000050" per chart paper division — and can be used interchangeably at will.

ADAPTABLE. Equipment shown is checking overall runout and bar-to-bar step measurement of commutator in electric motor. Can be furnished for checking runout of machine tool spindles, fan shafts, pump shafts, etc. — wherever the rotating part can be reached with an external probe.

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CIRCLE INFORM-A-GRAM KEY NO. 24

Month's Talk, from page 20

with the budget or cost standards. They have reason to believe that their cost goals are readily attainable, yet red variances appear on their budget statements month after month.

As we encountered this situation over and over again, it became clear to us that conventional budget practices were not the answer, and that a cost control procedure, to be workable for training purposes, would have to be based upon a new approach consisting of six fundamental concepts:

1. Engineered task and cost standards to gain acceptance.

2. Inclusion of the indirect workers in any plan of control to keep their time in proper relation to the direct workers.

3. Prompt reporting of results to enable constructive action to be taken before the control information becomes useless.

4. Fair adjudication of controversial charges for measurement purposes.

5. Financial inducement in one form or another for the foremen to bring all of their resources to their jobs and

6. A systematic follow-up to ensure the elimination of the causes of the operating losses.

In plants with limited piecework or incentives we greatly extended the coverage. In all plants we superimposed our cost control plan on the existing incentive.

In every case we included the departmental indirect workers in the productive departments. Thus was brought about a concert of effort between these people and the direct workers they served. In addition, management was given control over their time.

In all productive departments we set standards for certain expense items and considered the foremen's ability to reduce these costs, as well as their performance in controlling labor costs, as the basis for extra compensation. Some of the items we considered to be controllable by supervision were: overtime premium, factory supplies, perishable tools, tool maintenance, machinery maintenance, scrap, timekeeping, and inspection, and, also, rework. The list is not complete.

If you wonder why we held the foremen accountable for

. . . Continued on page 26

YOU GET SPEED PLUS ACCURACY WITH MOORE JIG GRINDERS

HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with ½° included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2¾ hours.*

CONTOURS, Too, Accurately Jig Ground and Checked in One Setting

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.

The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it contour grinds, chop grinds and slot grinds just as skillfully.

The Moore Jig Grinder, together with its toolroom teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

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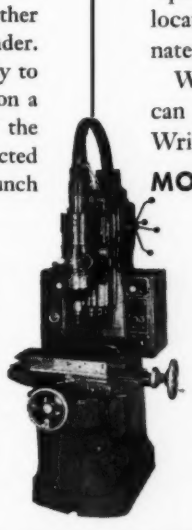
American Machinist Book Review
424 pages — $5 U.S.A., $6 elsewhere



NO. 2 MOORE JIG GRINDER
Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

see our catalog in MACHINE TOOL CATALOGS or write for copy

CIRCLE INFORM-A-GRAM KEY NO. 25

Get this free booklet

SAVE 40 WAYS

CONTENTS

1. Blending Directional Lines
2. Tool Life Extension
3. Satin Finishes for Sales Appeal
4. Decorative Finishes
5. Glare Reduction
6. Removal of Discoloration
7. Surface Preparation for Anodizing
8. Surface Preparation for Plating
9. Finishing Die Casting Dies
10. Finishing Forging Dies
11. Finishing Glass Molds
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19. Deburring
20. General Maintenance Cleaning
21. Cleaning—Degreasing Before Repairing
22. Rust and Corrosion Removal
23. Rebuilding and Reconditioning
24. to 40. Misc. Cleaning and Finishing

SEE HOW LIQUAMATTE® WET BLASTING CUTS PRECISION FINISHING COSTS

Fact-packed and fully-illustrated, this application brochure shows how and where precision-finishing costs can be cut with Liquamatte Wet Blasting. It also spells out in detail why Liquamatte Wet Blasting gives "hand finishes" mechanically at low cost. Send today for your free copy of this helpful, idea booklet.

American WHEELABRATOR®

trail blazer of industrial progress

AMERICAN WHEELABRATOR & EQUIPMENT CORP.

852 S. Byrkit Street, Mishawaka, Indiana

CIRCLE INFORM-A-GRAM KEY NO. 26

Month's Talk, from page 24

some costs outside their jurisdictions, the explanation is that we have a philosophy of foremanship somewhat different from the conventional. We consider that the foreman, as a user of these services, should have a voice in the value he receives from them. We believe he should raise some hell when he is charged with too much time-keeping or inspection. We do not believe that he should have the final say, of course. But we do not consider that he would be doing his job if he shuts his eyes to anything detrimental to the company's interest, just because it is outside his jurisdiction.

Measuring the Foreman's Progress

With an allowance worked out for each item of expense per direct labor hour or per machine hour as dictated by conditions, the standard expenditure permitted for these items was added to the amounts allowed for direct and indirect labor. From the ledger was taken the actual amounts spent for all three items and a comparison of one total with another indicated each foreman's achievement as the proprietor of the department which, in effect, has his name over the door.

Let me give you some figures taken from an actual case. In November 1954 the foreman of a screw machine department spent $43,194 for 4,395 hours of work. His ability as a proprietor was 75% and the cost of an hour's work was $9.83. By May 1955 his performance had improved to 120%, measured by the same standards. The cost of an hour's work had dropped, by the end of May, to $4.87 and the saving was $20,024. For the month of May he was paid 28½% in addition to his regular salary.

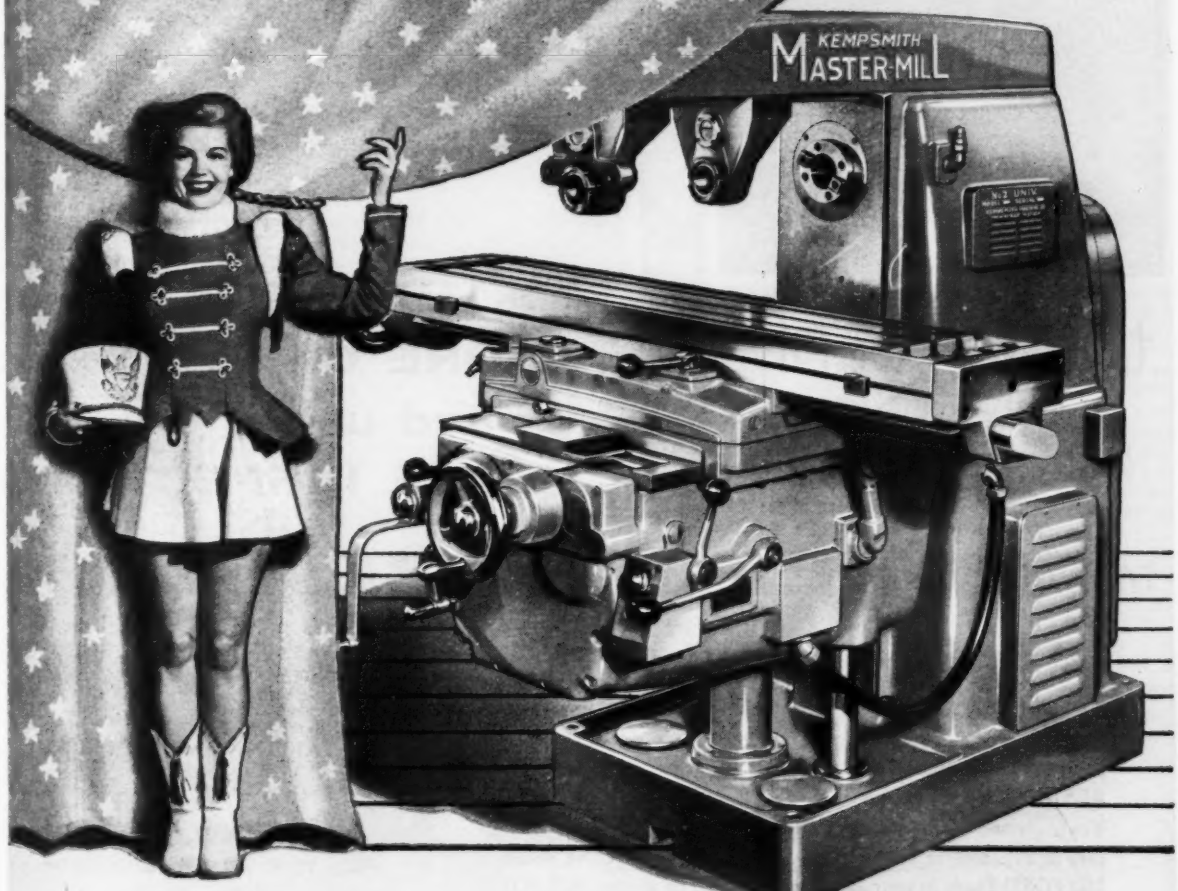
This case was not exceptional; plant wide, the cost per hour dropped from $5.32 last November to $4.93 in the May just passed. Savings are now running at the rate of $83,723 per month. There are just under 500 workers in the productive departments.

Proof of the Pudding

If one were to eavesdrop on a few of the conversations which

. . . *Continued on page 40*

Announcing the NEW KEMPSMITH MASTER-MILL



See these New MASTER-MILLS Demonstrated at the National Machine Tool Show Booth 616

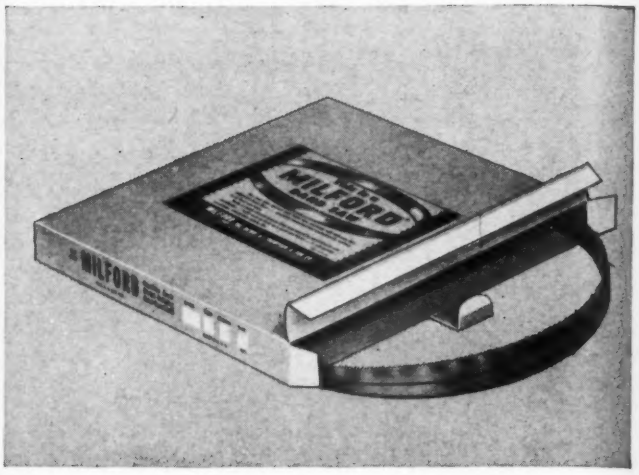
MASTER-MILLS — modern machines for production and general purpose milling — cut milling costs to rock bottom by fully utilizing modern cutting tools and techniques. Conveniently located controls permit more rapid set-ups, thereby providing more cutting time. Low initial cost, plus economy of operation, assure highest return on investment. Now available in sizes No. 2 and No. 3 — Plain and Universal models. For literature, write:
KLEMPSMITH MACHINE CO., 1829 S. 71st St., Milwaukee 14, Wis., U.S.A.

Precision-Built MILLING MACHINES Since 1888!

CIRCLE INFORM-A-GRAM KEY NO. 27

GOOD BAND SAW BLADES

aren't made ...in a HURRY!



that's WHY we take ... MORE CARE and use MORE INSPECTIONS making MILFORD BLADES

It might be metallurgically testing raw stock as it's received . . . checking the set while in process . . . straightening to insure straight cutting . . . or any one of numerous operations. But whenever extra care, or the substitution of a craftsman's skilled touch can contribute to added metal-cutting performance . . . MILFORD BLADES GET IT!

Yes . . . we build more into MILFORD Blades (even though they're available at competitive prices) and once you've tested a MILFORD Blade in your own plant, you will be another MILFORD user and booster.

WRITE FOR THE **MILFORD** CATALOG.

BUY FROM YOUR MILFORD DISTRIBUTOR
. . . a local business man, to . . .
SAVE TIME . . . *through local availability.*
CUT BUYING COSTS . . . *with one source of supply.*
REDUCE INVENTORY . . . *he carries the stock.*

THE HENRY G. THOMPSON & SON COMPANY
Saw Blade Specialists for over 75 Years
NEW HAVEN 5, CONNECTICUT

Profile Blades and Band Saw Blades • Hand and Power Hack Saw Blades

CIRCLE INFORM-A-GRAM KEY NO. 28

ALL ROLLING MILLS NOW USE Talide WORK ROLLS

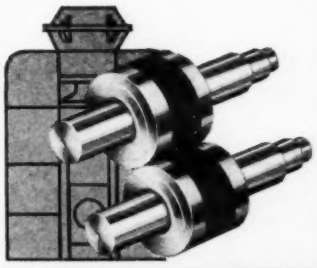
FOR EVERY TYPE FINISHING MILL

During the last five years Talide rolls have been adopted by every major strip steel producer. Metal Carbides pioneered and developed tungsten carbide rolls and successfully adapted them to all types of rolling mills including STECKEL, BLISS, UNITED, MESTA, STANAT, SENDZIMIR, WATERBURY-FARREL, TORRINGTON, RUESCH, FENN, WEAN, COLD METAL, etc.

Talide rolls have proven far superior to both steel rolls and carbide rolls of any other make.

168 to 7 hours

Leading Ohio strip steel producer averages 750 coils of various types and analyses between grinds, enabling them to operate their cold rolling mill continuously without roll changes for 7 days, 3 turns per day. Previous steel rolls used averaged 6-8 hours, necessitating 3 or 4 roll changes per day with considerable downtime.



210 to 5 days

Large Mid-Western producer of chrome-nickel alloy flat wire is averaging 7 months' continuous service between grinds compared to 5 days average run with steel rolls. Among other advantages, customer reports improved surface finish adds to sales appeal of finished product, fewer anneals are required to produce desired reduction, and wire runs cooler, resulting in less oxidation.

Talide work rolls are ultra-hard, extremely dense, and porous-free. Manufactured from highest purity tungsten carbide powders, the surface finish of a Talide roll is smoother than one micro-inch. Hard as a diamond, it will take a "bigger bite" than a steel roll. Strip steel of all analyses can be rolled down to thinner gauge, with more accuracy, greater reductions and with fewer anneals than possible with any other roll.

All users of Sendzimir rolling mills have adopted Talide work rolls because operating results have been phenomenal, far surpassing all expectations. The higher initial cost of Talide rolls is offset many times by the very substantial savings realized in less downtime, fewer regrinds, reduced scrap, reduced strain and stress load on back-up rolls, bearings and mill housings.

Tremendous production runs are commonplace with Talide rolls with mill after mill reporting increased tonnage-runs between roll changes of 278-1, 179-1, 82-1, etc. **Metal Carbides Corporation, Youngstown 7, Ohio.**

SPECIAL DIAMOND WHEEL for ROLL GRINDING

The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter.

ROLL REPAIRING

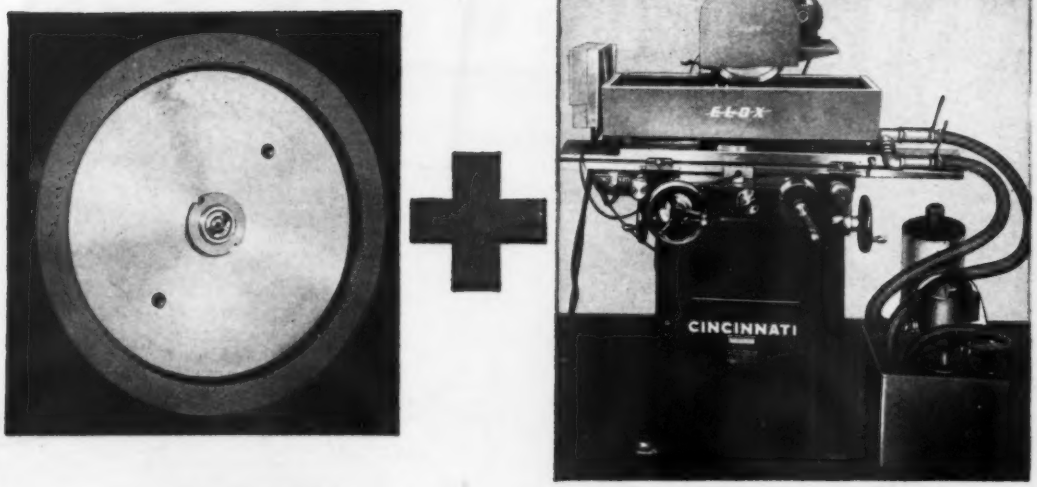
Broken or damaged carbide rolls can be re-worked to first class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

Send for new 84-page catalog 55-G

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 7, OHIO

HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 29



100% more pieces per grind
300% less tools required per job
400% savings in monthly tool cost

the superiority of ELOX electrical discharge grinding was proved by this large automotive company's unsolicited 2-month comparison report!**

Tool Name, Description:	Solid Carbide Insert	
Part Name:	Crankshaft	
Operation Name:	Finish Front & Rear Thrust Bearings	
	Standard Grind	Elox EDM Grind
TOTAL PIECES PER TOOL	17,290	95,904
MINUTES PER GRIND	21.0	13.75
COST PER GRIND	$ 1.26	$ .83
ESTIMATED MONTHLY TOOL COST	$294.71	$92.19

in writing **Elox will guarantee increased tool productivity over any type of abrasive grinding.**

Other Elox equipment available to remove broken taps, drills, etc., from $495 to $3450.

elox* *corporation of michigan*

**Comprehensive report and company name given on request.
*T. M. Reg.

734 NORTH ROCHESTER ROAD • CLAWSON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 30

Graph-Mo® steel die makes this "impossible" draw without galling or scoring

MANUFACTURERS Service Company in Cleveland was faced with a tough problem of making a die for a dryer fan housing 3⅞" deep. The scroll shape made it an all but impossible draw for ordinary die steels—they'd pick up and gall. Looking for an answer, they tried Graph-Mo®—one of four graphitic tool steels developed by the Timken Company. Result: good clean parts, no scuffing, no galling, no scoring.

Graph-Mo tool steel can handle jobs like this because of its unique composition. It contains free graphite, one of the best natural lubricants. This graphite gives Graph-Mo outstanding anti-friction properties and prevents scuffing and galling even in such difficult draws as this one.

Graph-Mo has a second great advantage over conventional tool steels: It outwears them on an average of three to one. Along with the graphite, Graph-Mo contains millions of tiny particles of diamond-hard carbides, one of the hardest-wearing substances known.

Despite its superior wear resistance, Graph-Mo machines about 30% easier than conventional tool steels. And it responds uniformly to heat treatment, thus requiring a minimum of grinding on the hardened dies.

Graph-Mo is one of four graphitic tool steels developed by the Timken Company. Would you like more information about their uses in dies, punches, gages and machine parts? Write for the new Timken Graphitic Steel Data Book just out. The Timken Roller Bearing Company, Steel & Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

CIRCLE INFORM-A-GRAM KEY NO. 31

WALES

announces a

FREE COST REDUCTION ANALYSIS

FOR SHEET METAL FABRICATORS

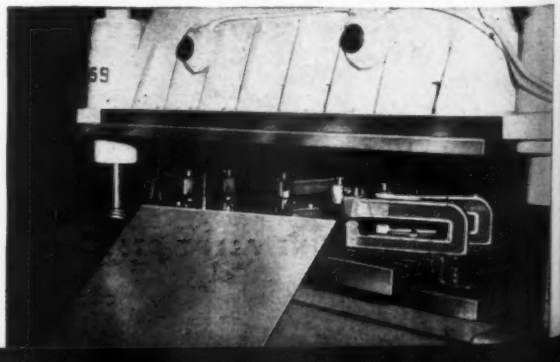
This free service includes a complete analysis of your sheet metal fabricating operations by Wales competent and experienced engineers. By analyzing your present or future parts production, Wales engineers provide you with an evaluation study of your present costs compared with Wales methods and tooling.

The astounding savings illustrated and described below, from one of many plants in the United States and Canada where the Wales Application Engineers have gone into operations, are typical of the huge savings made possible by Wales Production Method of hole punching and notching.

NO OBLIGATION, OF COURSE!

Typical of the many setups of the independent self-contained Wales Type "C" Hole Punching Units in a press brake at Canadair which produced in one year SAVINGS OF APPROXIMATELY 46,000 HOURS.

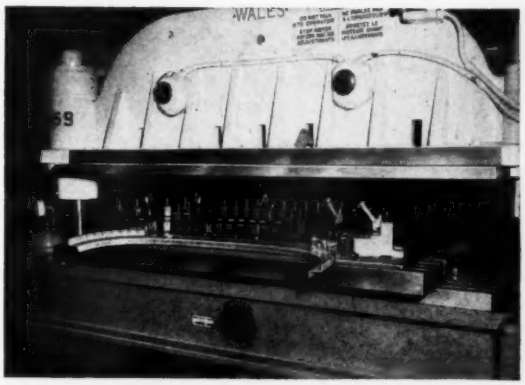
One of the many setups of Wales Type "BL" Hole Punching Units which are used and reused in unlimited hole patterns at Canadair producing in one year SAVINGS OF APPROXIMATELY 12,000 HOURS.



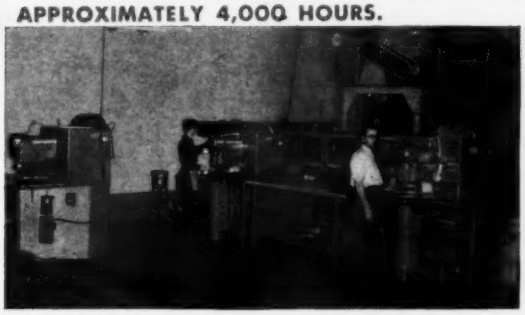
What WALES Metal Working Equipment has done for Canadair OF MONTREAL, LIMITED

In the "Wales Department", as this section of the Canadair plant is commonly called, where these time studies, savings and photographs were made is a very efficient and cost-conscious department which, due to continuous efforts, have improved on cost savings submitted in the original Wales analysis. Actual operations, after the purchase of the Wales tooling and equipment, showed the survey figures on the conservative side.

Production savings produced by Wales tooling and equipment made the initial purchase costs a relatively small item.



A setup of Wales "H" Hole Punching Units in a Wales Twin Column Press for horizontal punching of flanges at Canadair which produced SAVINGS OF APPROXIMATELY 4,000 HOURS.



Three Wales Fabricators with "Quick Change" punches and dies which provide unusual time-saving and money-saving advantages at Canadair.

HOW TO PUT THE WALES APPLICATION ENGINEERS TO WORK FOR YOU

Wales Application Engineers stand ready to make a complete evaluation of your sheet metal operations. Just call or write TODAY for an appointment at your convenience.

WALES-STRIPPIT CORPORATION

George F. Wales, *Chairman*
555 Payne Avenue, North Tonawanda, N. Y.
(Between Buffalo and Niagara Falls)

Specialists in Punching and Notching Equipment

Stocking bins and setup table for Wales Units at Canadair. Note setups are made outside the press and when placed in press are ready to operate with the first stroke of the ram.

Three setups of Wales Units in a press brake punching three different parts at the same time reducing press time by two-thirds. Note nothing is attached to press ram. Punches and dies are automatically aligned by self-contained Wales Units.

NEW *Grip-Tip* CENTERS

CHECK THESE *Grip-Tip* FEATURES

- Long-Life Holders
- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
- Carbide Tips Accurate to .0005"
- No Regrinding of Holder
- Carbide Tips Are Easy and Inexpensive to Stock
- Reduced Regrinding Time
- Longer Diamond Wheel Life

with REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are reground. Because the steel holder is not ground when sharpening the carbide tip there is less clogging and longer life for your diamond wheels. Also, the relatively inexpensive double end tips in both male and female types can be stocked with a minimum investment . . . Grip-Tip Centers reduce tool and inventory costs.

Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

For Further Information, Write to:

DETROIT REAMER & TOOL CO.

2830 EAST SEVEN MILE ROAD • DETROIT 34, MICHIGAN

D R & T COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 34

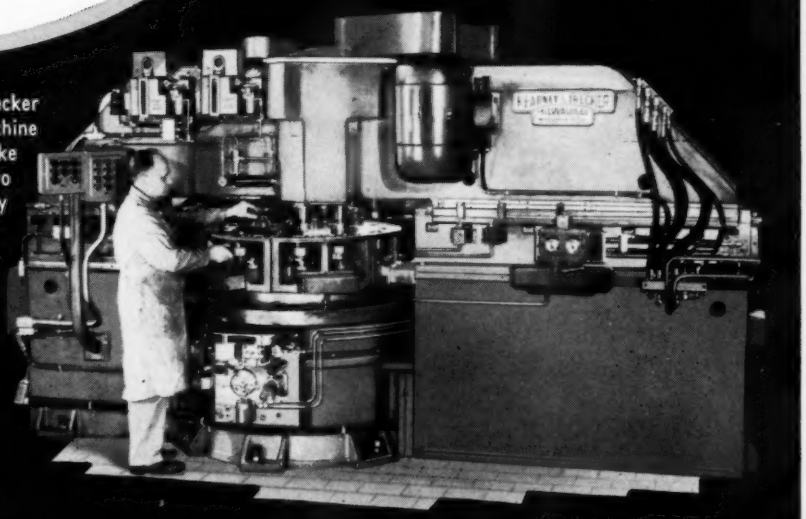
CUSTOMER SPECIFIED

An automotive manufacturer recently asked Kearney & Trecker to design and build a special machine which would increase production milling of three pads and three pockets on transmission rear brake drums.

Black area indicates machined pads and pockets on transmission brake drum.

KEARNEY & TRECKER DESIGNED

Here is our design. It's a Kearney & Trecker six-station rotary indexing milling machine which mills 162 transmission rear brake drums per hour. It does the work of two machines, each of which could mill only one workpiece at one time. With the new unit, six pieces are milled at once. A prominent feature of this machine was the application of standard Kearney & Trecker units . . . a 48" rotary index table and a 24" feed slide. This type of design appreciably decreases the overall cost of the machine. All six spindles are contained in one head which is bridged over the table. Retractable quills raise and lower the spindles.



New production efficiency starts with Kearney & Trecker Milwaukee machine tools

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill required to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

For more details on the machine illustrated ask for Data Sheet No. 1044. The free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Special Machinery Division

MILWAUKEE 14, WISCONSIN, U.S.A.

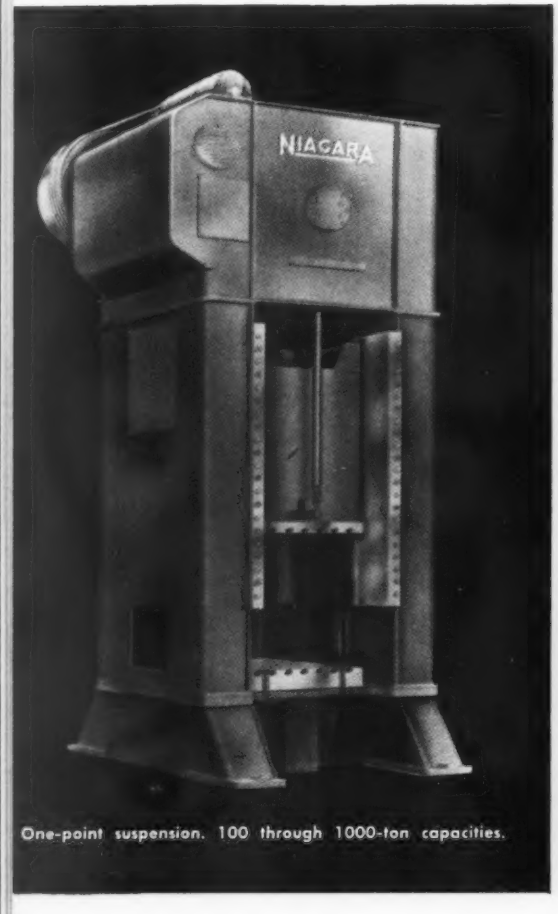
Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 35

NEW!

MASTERFULLY ENGINEERED

excels in large, heavy tonnage



One-point suspension. 100 through 1000-ton capacities.

Four-point suspension. 200 through 1000-ton capacities.

ECCENTRIC DRIVE DELIVERS GREATER TORQUE WITH LESS DEFLECTION

In Niagara Series SE Presses, the eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. Net result: Niagara's eccentric gear design can deliver greater torque with less deflection than other types of construction.

RUGGED, RIGID, ALL-STEEL FRAMES PROVIDE GREATER ACCURACY, LONGER DIE LIFE

Frames are rugged, all-steel, four-piece, tie-rod construction of great strength and rigidity, stress relieved in a furnace and thoroughly grit-blasted before machining. Each frame size has been scientifically tested for deflection to meet Niagara standards — the most exacting in the industry.

LOW INERTIA, PNEUMATIC FRICTION CLUTCH RUNS COOLER, WEARS LONGER

Most of the weight of the Niagara clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle. The resulting low weight and inertia of the parts, picked up during clutch engagement, greatly reduce heat and wear. As the clutch rotates, it acts as a centrifugal blower, providing positive ventilation. Plates automatically compensate for normal wear, with no adjustment necessary.

MODERN, STREAMLINED DESIGN EMPHASIZES COMPACTNESS

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily.

LINE OF METALWORKING CHAMPIONS

drawing, punching and blanking work

Two-point suspension. 200 through 1000-ton capacities.

Without equal in engineering design, performance and stamina, this great new line of Niagara Straight Side Eccentric Geared Presses is every inch a champion. It is an outstanding example of the advanced thinking that has made Niagara the pace-setter among builders of metal working machines for 75 years.

Masterfully engineered and ruggedly constructed to handle a tremendous variety of work, the new Niagara SE Series is the most practical and dependable press line built for:

- Work requiring large die areas.
- Heavy tonnage demands.
- Long stroke, deep drawing jobs where work is engaged high up on the stroke.
- Bottom-of-stroke blanking and punching.

THE COMPLETE STORY IS READY FOR YOU NOW!
Make a feature-by-feature appraisal of what these great new presses can do for you. Write for newly published, illustrated Bulletin 66. It will be forwarded promptly without obligation.

NIAGARA MACHINE & TOOL WORKS • BUFFALO, 11, N.Y.
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA
Dealers in principal U. S. cities and major foreign countries.

DELUXE OPERATING CONTROLS INSURE UTMOST SAFETY, EFFICIENCY AND CONVENIENCE

Compactly and conveniently arranged on a master panel, Niagara controls are instantly accessible for fingertip direction of every press operation: starting, slide adjusting, jogging, die tryouts, running and stopping. The latest safety devices provide maximum protection for die setter, operator and the press itself. Nothing has been overlooked. Trial runs assure that all controls are in proper working order before each Niagara press leaves the plant.

NIAGARA

STRAIGHT SIDE
ECCENTRIC GEARED
PRESSES

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

Why Pipe Machinery Gages Can Never Be Cheap

●The Finishing Room and Measuring Laboratory, the very heart of our gage plant, are both maintained at a constant standard 68 degree temperature.

Here, highly skilled, unhurried men and women, with a high average experience in this work, are the guardians of our quality. They work under ideal conditions and with the very latest of finishing and inspection equipment.

Shown on this page are some of the measuring and finishing instruments in constant use by these people.

Only because of this investment in experience and the very finest equipment can we assure you of the top accuracy that has made The Pipe Machinery Company a leader in the quality gage field.

A REQUEST ON YOUR LETTERHEAD TODAY WILL BRING YOU OUR CATALOG NO. 10

THE PIPE MACHINERY COMPANY

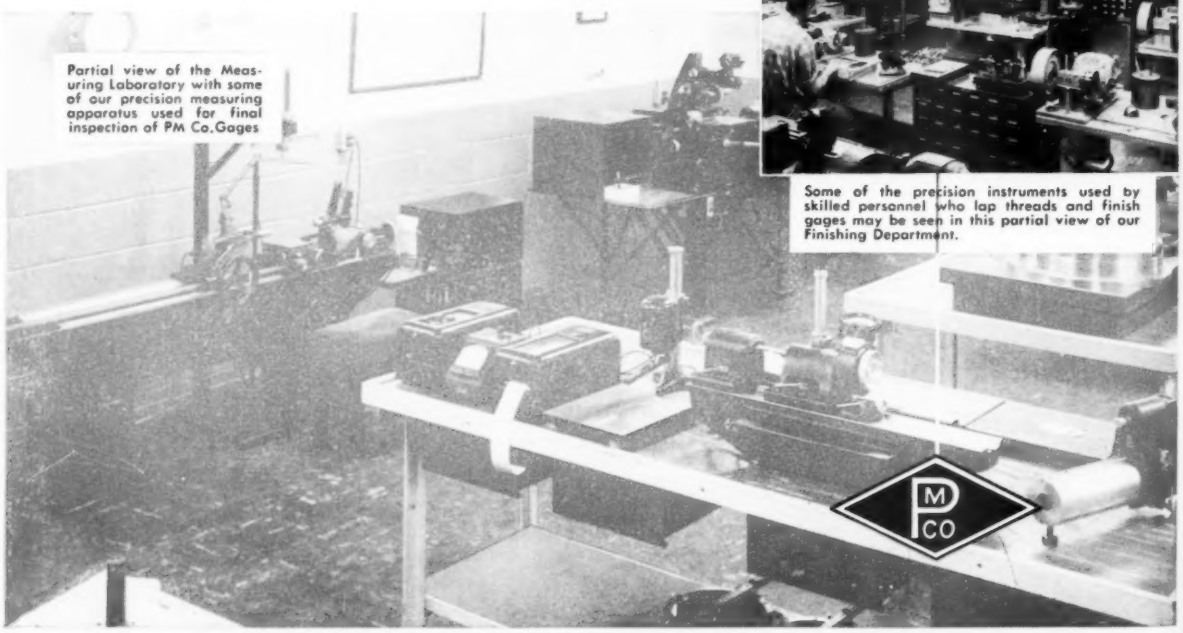
SINCE 1912

29102 LAKELAND BLVD. ● WICKLIFFE, OHIO

Length Measuring Machine in our Measuring Laboratory used on lengths, diameters of thread gages, and for tapers for practical measurements to .00001"

This Universal Measuring Microscope magnifies 30 times and measures to half .0001"; permits easy estimation to .00001" on lead, angle, and thread depth.

Some of the precision instruments used by skilled personnel who lap threads and finish gages may be seen in this partial view of our Finishing Department.

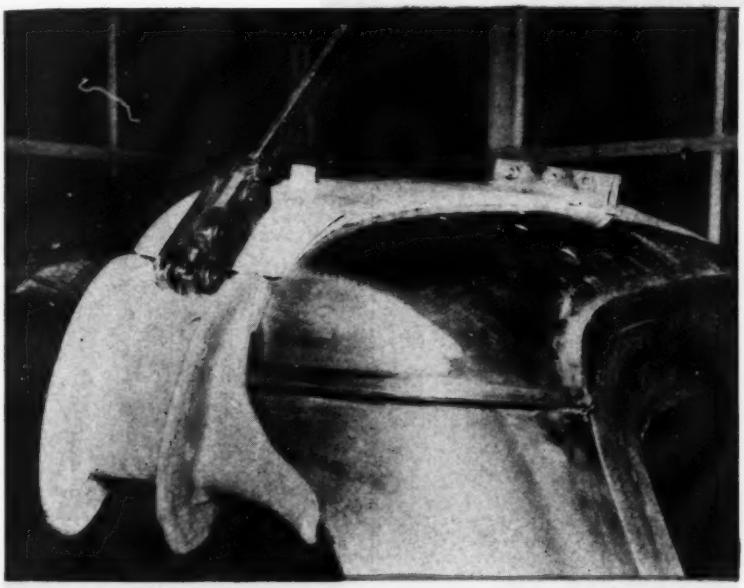


Partial view of the Measuring Laboratory with some of our precision measuring apparatus used for final inspection of PM Co. Gages

PMCO

CIRCLE INFORM-A-GRAM KEY NO. 38

Tooling time cut 50% with compounds based on BAKELITE TRADE-MARK Epoxy Resins



REZOLIN *Toolplastik* Compound was cast against a finished body to form this spot welding jig. Time: only 21 hours compared with 45 to 80 needed to make one of conventional materials. Based on BAKELITE Epoxy Resin, this tooling compound is produced by **Rezolin, Inc., Los Angeles 45, Calif.**

Now metalworking tools can keep up with fast model changes. Less time, lower costs result because BAKELITE Brand Epoxy Resins offer these advantages:

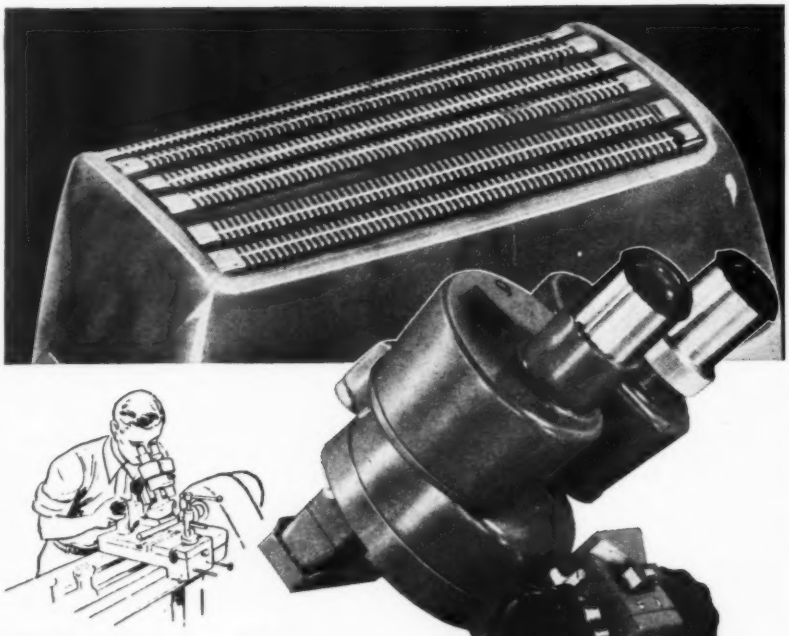
- **Liquid compounds—can be cast to shape without pressure**
- **Cured at room temperature—no applied heat**
- **Minimum shrinkage—minimum finishing**
- **Excellent flexural, compression, and impact strengths**
- **Outstanding dimensional stability**
- **Light weight means easy handling**
- **Laminated with glass cloth to form jigs, spotting racks, fixtures, and Keller models.**

For further information, write Dept. **JU-182**

BAKELITE BRAND
Epoxy Resins for Tooling

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC
CIRCLE INFORM-A-GRAM KEY NO. 39

How REMINGTON RAND uses 3-D Micro-Vision to maintain peak shaver production



Remington Rand has solved the problem of critical inspection with Bausch & Lomb Stereomicroscopes. And it's done with an increase in production. Clear, sharp, magnified views of shaver head—with natural depth perception—quickly reveal flaws such as tiny cracks, bent blades, burrs, contact between cutter and head. Increased operator comfort, higher efficiency, keep peak production rolling.

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MICRO-VISION BOOK

- See actual stereo views!
- Know how and where to use Stereomicroscopes!
- Fit exact model to job needs with Selector-Chart!

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SINCE B&L 1853

STEREOMICROSCOPES

America's only complete optical source. . . from glass to finished product.

CIRCLE INFORM-A-GRAM KEY NO. 40

Month's Talk, from Page 26

take place between foremen and other key men in plants using this plan, he would gain a clear conception of the breadth and intensity of interest.

Case I

Screw Machine Foreman to Personnel Manager: "Some of my men cannot reach their production quotas when the tolerances are close."

Personnel Manager: "Are you being fair about it— have you trained them as you should? — are the standards right?"

Foreman: "The standards are not right in every case but they are not 100% wrong. Some of the men shouldn't have been hired in the first place. They are not grade A mechanics and yet they are drawing top rates. I haven't the time to wet nurse them."

Personnel Manager: "How did they get to the top of the range if they didn't deserve it?"

Foreman: "They got there because of union pressure and senicrity. They were raised before my results were being measured as they are now."

Personnel Manager: "According to the contract we can terminate anyone who consistently fails to earn his guaranteed rate. I'll check with Industrial Engineering and see that the tight standards are adjusted. Then if the fault lies entirely with the men I'll transfer them to work they can do or I'll take some other action to relieve you of the loss they are causing."

Case II

Superintendent to Works Manager: "The gas tank foreman was penalized yesterday by rework hours which would have been avoided if I had had steel that was up to standard."

Works Manager: "Let me check with Purchasing." Talks for a few minutes and turns back to Superintendent: "Don't use any more of it. You will have first quality steel tomorrow. Furthermore, don't struggle with sub-standard material in the future. Let me know when you have trouble so I can see what can be done to help you."

Case III

Foreman to Chief Industrial Engineer: "Some of my men look like bums because the routings are not up to date and the standards are based on obsolete methods."

Chief Industrial Engineer: "I know that and we are correcting the routings and the standards as fast as we can."

. . . *Continued on page 42*

HELPS

CLEARING

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION DIVISION OF ***U.S. INDUSTRIES, INC.***

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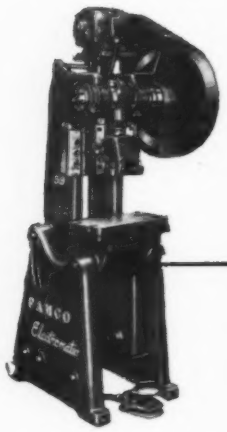
famco MACHINES

pay real cost-saving dividends



Famco machines—the choice of more and more leaders in the metal-working industry. This ever-increasing stamp of approval is in recognition of the superior quality and performance built into every Famco Machine. All parts are given that extra care in manufacture which means savings in time and money. They're simple to install, easy to operate, economical to use.

POWER PRESSES

Open back inclinable, standard and deep throat in bench and floor models. Ratings range from 4 to 18 tons capacity. Larger models feature the revolutionary and exclusive Famco "Elecromatic" 9-point jaw clutch.

ARBOR PRESSES

Plain lever, simple ratchet, and combination compound and simple ratchet models — bench and floor models, deliver up to 15 tons pressure.

DRILL PRESSES

28 models of 15" presses in single and multiple spindle; tilting table and production models, bench and floor types.

AIR PRESSES

20 models, bench and floor types, ½ to 3½ tons capacity. Built-in electric or air controls, single or dual control type.

FOOT PRESSES

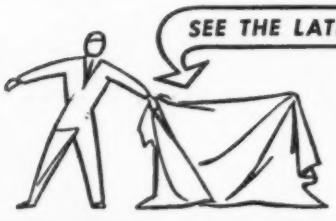
Constructed of semi-steel close grained castings; precision-machined for long, unsurpassed, trouble-free operation. 10 bench and floor models that deliver up to 3¾ tons pressure.

BAND SAWS

4 models of horizontal cut-off saws for dry or wet cutting, with or without coolant system. Capacity: 6" round and 6" x 12" rectangular stock.

SQUARING SHEARS

18 models, modern all steel construction, shear up to 14 gauge mild steel; cutting widths 22 to 52 in. Power models feature single stroke mechanism and the exclusive Famco "Electro-Matic" 9-point jaw clutch.



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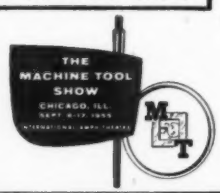
FIRST SHOWING BOOTH NO. 507 AT THE MACHINE TOOL SHOW



famco machine company

3124 SHERIDAN ROAD • KENOSHA 85, WISCONSIN

Air Presses • Arbor Presses • Band Saws • Drill Presses • Foot Presses
Power Presses • Squaring Shears

CIRCLE INFORM-A-GRAM KEY NO. 42

Month's Talk, from Page 40

Foreman: "That ain't fast enough. I want it done yesterday. It's unfair to measure my performance with two-foot yardsticks."

Case IV

Cost Control Administrator to Comptroller: "Why are you charging the cost of moving the departments, when two were combined, as an operating expense?"

Comptroller: "That's what it is."

Cost Control Administrator: "Yes but it was the result of a management decision; the foreman had nothing to do with it."

Comptroller: "You can protect the foreman by disregarding the expense on your control records. I've got to show it as it is. What you do won't affect my accounting because my cost system is independent of your control plan."

Cost Control Administrator: "Thanks, that's what I'll do. We can't sock the foreman for a cost incurred by executive decision."

Case V

Consultant to Superintendent: "Now that we have squeezed all the waste out of the factory, why don't we discontinue the foremen's premium and force them to do what we now know they can do?"

Superintendent: "It wouldn't work. They consider themselves proprietors, and with the training they have had they could start businesses of their own. They are working much harder than they formerly did. If you take anything away from them you would kill the golden goose. Speaking for myself I'll tell you quite frankly that my own premium means something to me."

Consultant: "Those are exactly my sentiments. I put the question that way to sound you out. I'm glad you said what you did."

Case VI

Consultant to Works Manager: "Haven't you done pretty well to be shipping the Heat Shell, considering that — (one of the big rubber companies) hasn't started and yet they received their contract at the same time you received yours?"

Works Manager: "We think so. It certainly is gratifying to a man in my position to have foremen who will pitch in without being ordered. Henderson has forgotten that he has a home. Steve Boyle is downstairs helping Herb Jeavons on a strictly voluntary basis. Andy Clark is spending a lot of time in Heat Shell and yet he has nothing to do with it officially. Such men with their attitudes are a real help and a joy to work with."

. . . *Continued on page 48*

Olympic FM

DIE STEEL . . . used on

Roto-Flo Spline Rollers

SAE 1040 splines being cold formed.
Photo courtesy Michigan Tool Co.

Michigan Tool Co., Detroit, selected

Olympic FM for this severe cold forming application

On the new Roto-Flo Spline Rollers manufactured by the Michigan Tool Company, Latrobe's Olympic FM Die Steel has been specified for use in the cold forming racks shown above. This is a severe application involving heavy pressure to cold-form steel splines, serrations and similar shapes . . . an application that demands up to 150,000 production pieces before the racks are removed for regrinding.

Olympic FM . . . one of Latrobe's new free-machining high carbon-high chromium die steels . . . has proved extremely successful on long production runs of all types of tools and dies. In addition to long performance characteristics, Olympic FM yields a superior machined finish and easier machinability . . . factors resulting from the addition of alloy sulphides uniformly dispersed by the DESEGATIZED® process of manufacture.

For improved machinability and long production runs, order Olympic FM . . . over 250 sizes are stocked in ten conveniently located warehouses. Your order will be handled promptly and courteously.

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MACHINE TOOL SHOW
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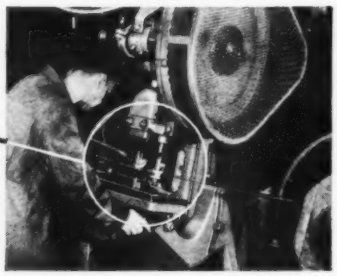
Branch Offices and Warehouses in principal cities

money saving

Accessories for your plant

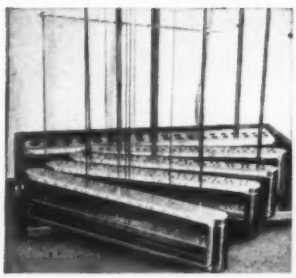
Each of the accessories illustrated and described below was designed and built for a definite need and used in our own plant before being offered to industry. They require a relatively small investment, yet will save you money every day. For further information, write for the folder offered below.

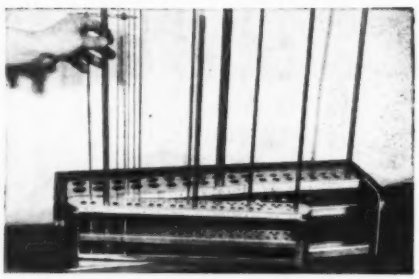
LEADER PIN OILERS



Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

DRILL ROD RACKS



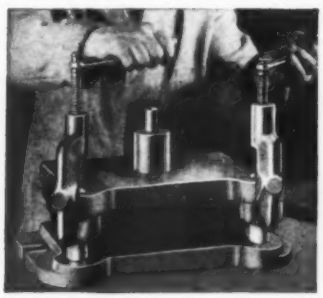


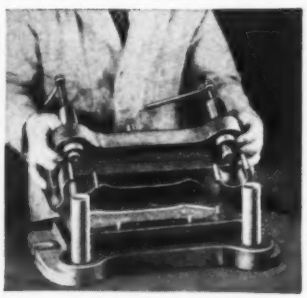
Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.

Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to 1/2" and in 32nds from 1/2" to 1" included.

Also available in half size with fractions or numbers.

DIE SET PULLERS





The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. Available in three sizes.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin 1P-55

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CIRCLE INFORM-A-GRAM KEY NO. 44

faster dis-assembly | no re-alignment problems

O-M has the KEY to simpler cylinder maintenance

O-M Cylinders save down-time expense and headaches when it comes time to replace packing and seals. SPECIAL INTERNAL LOCKING KEY is released by rotating end cover, which allows quick, easy removal of cover and rod. And re-assembly is fool-proof. There's only one way to take an O-M Cylinder apart, one way to put it together. Key controls positioning . . . locks cover securely. No threads to strip. No tie rods and end caps to bolt together. No time-consuming alignment and adjustment problems.

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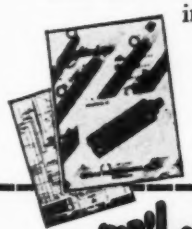

fit where others won't

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for FREE catalog, complete set of ½-scale templates, showing all cylinders, mounts and mounting brackets.

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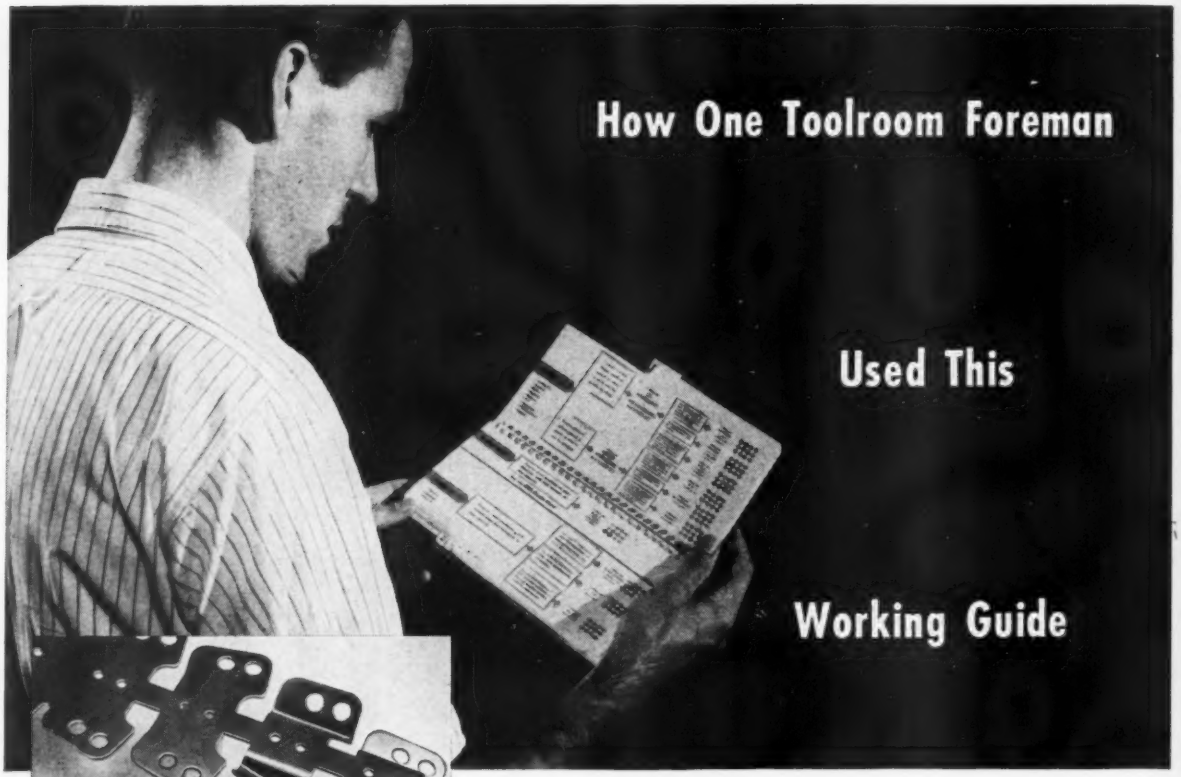
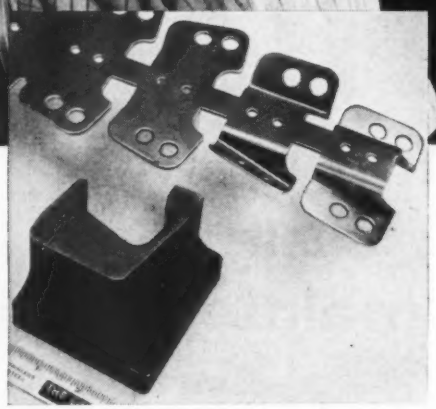
CIRCLE INFORM-A-GRAM KEY NO. 45





Job: Punch that blanks stampings from SAE 1010 strip, .062" thick.

Problem: The punch is so unbalanced in design that safety in hardening is vital. Also, the punch is shear fitted to the die, and hardening accuracy is necessary to avoid expensive adjustments after heat treating. Other die steels were tried, but they either broke or changed size too much.

Solution: At this point the Toolroom Foreman called in Carpenter and started to become more familiar with the Matched Tool and Die Steel Manual. The Manual pointed to Carpenter *Vega* (Air-Tough) Die Steel for the punch. Now they're coming through right on the nose. Moreover, production between grinds has jumped from about 10,000 to 50,000 stampings. And the Foreman says that from here on, all his tools and dies will be made from Carpenter Matched Tool and Die Steels. (Write for a more detailed Field Report on this job.)

. . . To Increase Tooling Productivity

This is for the man responsible for tools and dies who looks at a diemaking job with these thoughts:

"How can I make it *easier?*"

"How can I avoid costly *heat treating hazards?*"

"What can I do to *improve the job?*"

If you're that man, Carpenter wants to help. We offer you plain, *practical* help based on almost 70 years' experience working with other men who feel like you do.

How does it pay off? Look at a typical example shown to the left! And your Carpenter representative can show you many more Field Reports of other interesting jobs.

Much of this help is packed into a 189-page working guide . . . Carpenter's "Matched Tool and Die Steel Manual". And that's only part of the program . . . a program backed by *dependable* die steels developed in Carpenter Research Laboratories with a long record of pioneering in new and improved steels.

We're ready to work with you, now. A call to your nearest Carpenter Mill-Branch Warehouse, Office or Distributor will tell us you are, too.

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Matched Tool and Die Steels

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Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

CIRCLE INFORM-A-GRAM KEY NO. 46

Will You Be There?

Aug. 22-23. Stanford Research Institute and National Industrial Conference Board. Symposium. Electronics in Automatic Production. Sheraton-Palace Hotel, San Francisco, Calif.

•

Sept. 6-17. National Machine Tool Builders' Association. Machine Tool Show. International Amphitheatre, Chicago, Ill.

•

Sept. 6-17. Production Engineering Show. Navy Pier, Chicago, Ill.

•

Sept. 6-17. Coliseum Machinery Show. Chicago Coliseum, Chicago, Ill.

•

Sept. 12-16. Instrument Society of America. 10th Annual Instrument-Automation Conference and Exhibit. Shrine Exposition Hall and Shrine Auditorium, Los Angeles.

•

Sept. 15-18. Packaging Machinery Manufacturers Institute. Annual Meeting. Homestead, Hot Springs, Va.

•

Sept. 20-22. Society of Industrial Packaging & Materials Handling Engineers. 10th Annual Industrial Packaging & Materials Handling Exposition. Kingsbridge Armory, New York.

•

Oct. 5-9. World Plastics Fair and Trade Exposition. National Guard Armory, Exposition Park, Los Angeles.

•

Oct. 10-12. American Society of Lubrication Engineers and American Society of Mechanical Engineers, Lubrication Activity Committee. 2nd Joint Lubrication Conference. Antlers Hotel, Indianapolis, Ind.

•

Oct. 17-21. National Safety Council. 43rd National Safety Congress and Exposition. Conrad Hilton, Congress, and LaSalle Hotels, Chicago.

•

Oct. 24-26. American Standards Association and National Bureau of Standards. 6th National Conference on Standards. 37th Annual Meeting of American Standards Association. Sheraton Park Hotel, Washington, D. C.

•

Oct. 26-28. American Society of Body Engineers. 10th Annual Technical Convention. Rackham Memorial Building, Detroit.

•

Oct. 27-28. Illinois Institute of Technology and Armour Research Foundation of IIT. 11th Annual National Conference on Industrial Hydraulics. LaSalle Hotel, Chicago.

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THE DE SILVEY CORP. SPECIALIZES IN WARNER & SWASEY LATHE REBUILDING. Our craftsmen have years of experience in one kind of job, rebuilding and reconditioning W. & S. machines.

THE DE SILVEY CORP. USES ONLY WARNER & SWASEY PARTS FOR REPLACEMENT. Should the situation arise where-in such parts are unavailable, we are equipped to duplicate such parts and retain our guarantee.

THE DE SILVEY CORP. PRE-SELECTED-SCHEDULE-OF-PARTS-REPLACEMENT. We know from experience where and when to look for trouble and have the replacement part ready and waiting.

THE DE SILVEY CORP. CHARGES. For our rebuilding and reconditioning service, we charge approximately one third the cost of replacement by a new machine. At the completion of our rebuilding service the machine will be as accurate and efficient as it was when new.

THE DE SILVEY CORP. WARRANTY. We extend the same warranty regarding the accuracy of the rebuilt machines as the original manufacturer. All materials and workmanship are guaranteed unconditionally against defects.

THE DE SILVEY CORP. SERVICE. The service does not stop when the machine is rebuilt. We assist in the installation, demonstrate the machine in your plant, and, from then on, are available for prompt service at any time.

THE DE SILVEY CORP. RECORD. We have rebuilt and reconditioned machines for Eastman Kodak, Buffalo Pumps, Bell Aircraft and many other companies. If you'd like to know more of our operation, fill out the coupon below and we'll send you our brochure showing who we are, how we work, and what we can do for you.

THE DE SILVEY CORP. CAN LOCATE the machine you want then rebuild it to your specific needs with new machine guarantee.

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NEW! BAUSCH & LOMB WIDE FIELD MACROSCOPES 10X to 40X

Handy 'scopes spot-check production, speed small parts work

- **Actual size as shown here ... compact, handy**
- **Shows natural right-side-up views... easier for inexperienced users... a big help in precision assembly!**

Just grab this dependable inspection aid for on-the-spot checks of work and materials in any phase of production. Available with folding tripod or sturdy microscope stand, for detailed study and for small-parts assembly. You can even build it right into production machinery!

Upright images are sharp and detailed to the very edge of the extremely wide field of view. Long working distance makes it easy to manipulate specimens ... gives operators plenty of room for precision assembly and repairs. (Also available as straight tube for applications where upright image is not required.)

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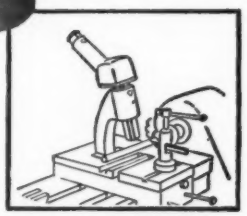
ON-THE-JOB DEMONSTRATION!

Find out how this inexpensive production tool can lower your manufacturing costs. WRITE, WIRE or PHONE today for free demonstrations and Data Bulletin D1052. Bausch & Lomb Optical Co., 79844 St. Paul St., Rochester 2, N. Y. (Phone: LOcust 3000).

Use it in tripod...

In microscope stand...



... or even built into machinery!

BAUSCH & LOMB
SINCE 1853

AMERICA'S ONLY COMPLETE OPTICAL SOURCE
... FROM GLASS TO FINISHED PRODUCT

CIRCLE INFORM-A-GRAM KEY NO. 48

Month's Talk, from Page 44

Case VII

Union Steward to Screw Machine Operator: "How is it that you are making more money than you used to and you are still on the same job?"

Operator: "One reason is that I don't wait so long for setup, and the setup men are now doing a better job than they used to do. Now when they turn the job over to me it is ready to run. Before, I had to monkey with the setup before I could produce good pieces. Another reason is that the foreman now comes around to help me instead of sitting on his fat duff."

Case VIII

Tool Crib Attendant to Foreman: "This requisition is for less than half the quantity you used to order."

Foreman: "That's O.K."

Tool Crib Attendant: "I used to fight to get you to order fewer tools and now you do it voluntarily."

Foreman: "The old gray mare ain't what she used to be. I've got religion now."

Case IX

President, addressing Foremen's meeting: "The cost control plan changed our philosophy of foremanship. Before its introduction we thought of our foremen as coordinators; links in the chain of command for the purpose of drawing all loose production ends together at the department level. As coordinators, you executed plans made by production planning and if two small lots requiring considerable setup followed in close succession, the cost of setting up the second time was not your concern. If tools were poorly designed you felt no responsibility. If the maintenance department took too long to repair a machine or through lack of preventive measures your production was interrupted by a breakdown, the responsibility was laid at the works manager's door because he was the one ultimately in charge.

"Considering you as managers or proprietors of your own businesses, the company supplies space, machinery, power, material, etc. It also gives you services and aids; services such as maintenance which I referred to, time study, methods, cost records, timekeeping, inspection, etc. As was formerly the case, these services do not come under your jurisdiction but you now have a voice in their administration. If you are not properly served, you have every right, — in fact you are expected, to demand satisfaction through your superior. You are the customer and your views must be considered.

. . . *Continued on page 101*

BAKER

SENSITIVE DRILLING MACHINES

- ★ IMMEDIATE DELIVERY
- ★ MULTIPLE SPLINED SPINDLE
- ★ DYNAMICALLY BALANCED
- ★ SPEED INDICATOR & SELECTOR
- ★ PRELOADED SPINDLE (See Cutaway)
- ★ TWO PIECE FRAME CONSTRUCTION FOR FLEXIBILITY

MACHINE SHOWN WITH 22 X 34 TABLE

The Baker line of drilling and boring machines is now more complete than ever before, with the addition of the new Baker Sensitive. Baker's 75 years of engineering experience in the drilling and boring field is now at your disposal in light-duty sensitive type units. The machine illustrated is *best* for light-duty drilling operations. Let Baker Representatives tell you how the Baker will save you money and put you ahead of competition.

Cutaway shows why the Baker spindle preloading prolongs drill life. Ball bearings also lengthen tool life. These, and many other features mean *money* to you.

GENERAL SPECIFICATIONS

KTVS VERTICAL MOTOR DRIVE

1" CAPACITY IN CAST IRON, ⅝" IN STEEL

Spindle centerline to column face	12"
Spindle speeds—with 1200 R.P.M. motor	275-1375*
Spindle travel	7"
Rack travel	10"
Table adjustment	32½"
Morse Taper in spindle nose	#2 or #3

*Speed adjustment between the lowest and highest speed is INFINITE through selector.

See us at

BOOTH 1421

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATER

MT

BAKER BROTHERS, INC.

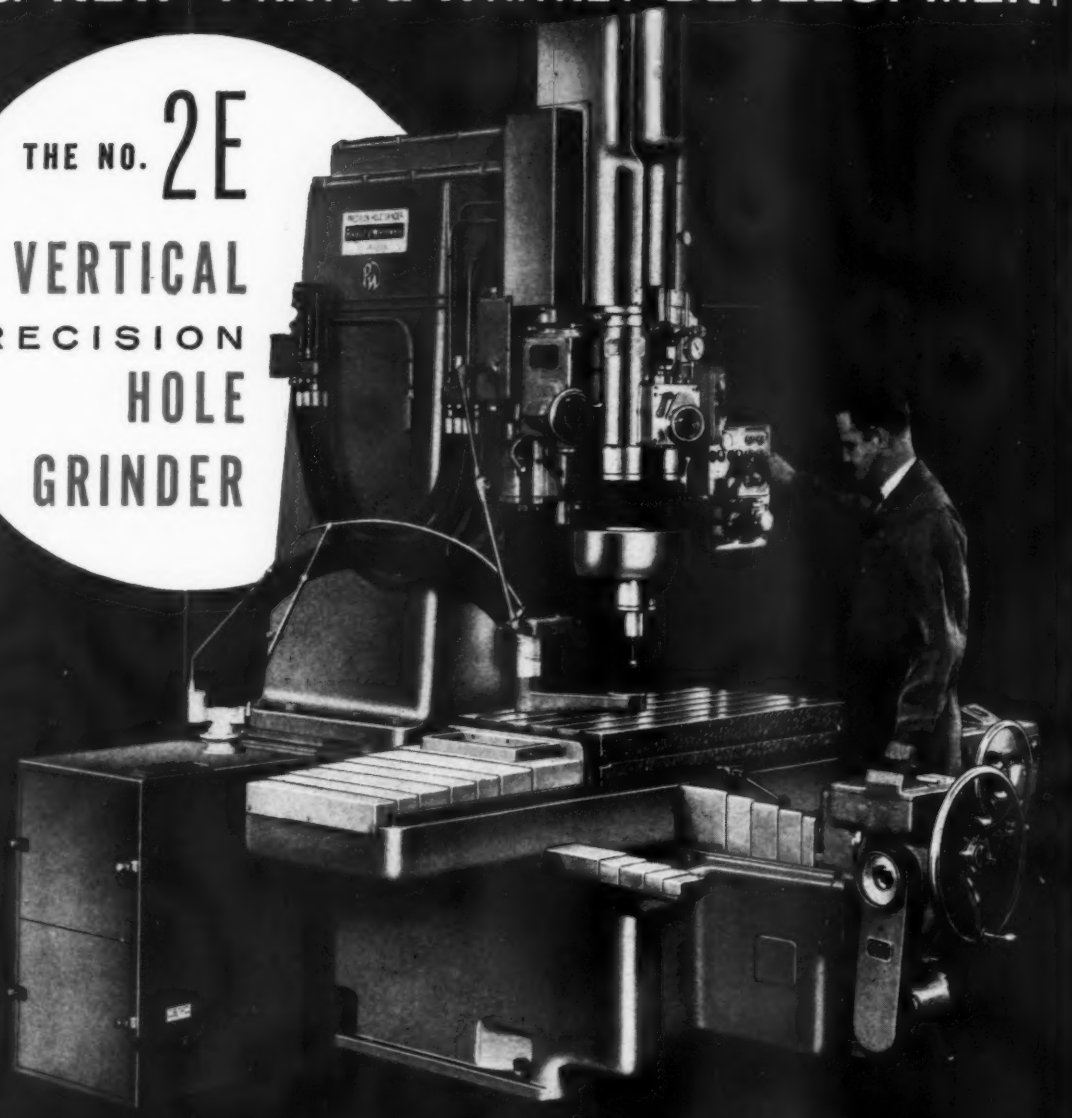
TOLEDO, OHIO

DRILLING...TAPPING...KEYSEATING...CONTOUR GRINDING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 49

Another **NEW PRATT & WHITNEY DEVELOPMENT**

THE NO. 2E VERTICAL PRECISION HOLE GRINDER



- **EXTREMELY ACCURATE** . . . Incorporates the famous P & W Electrolimit Measuring System. Table settings accurate to .0001". Grinds straight or tapered holes and radii with extreme accuracy.
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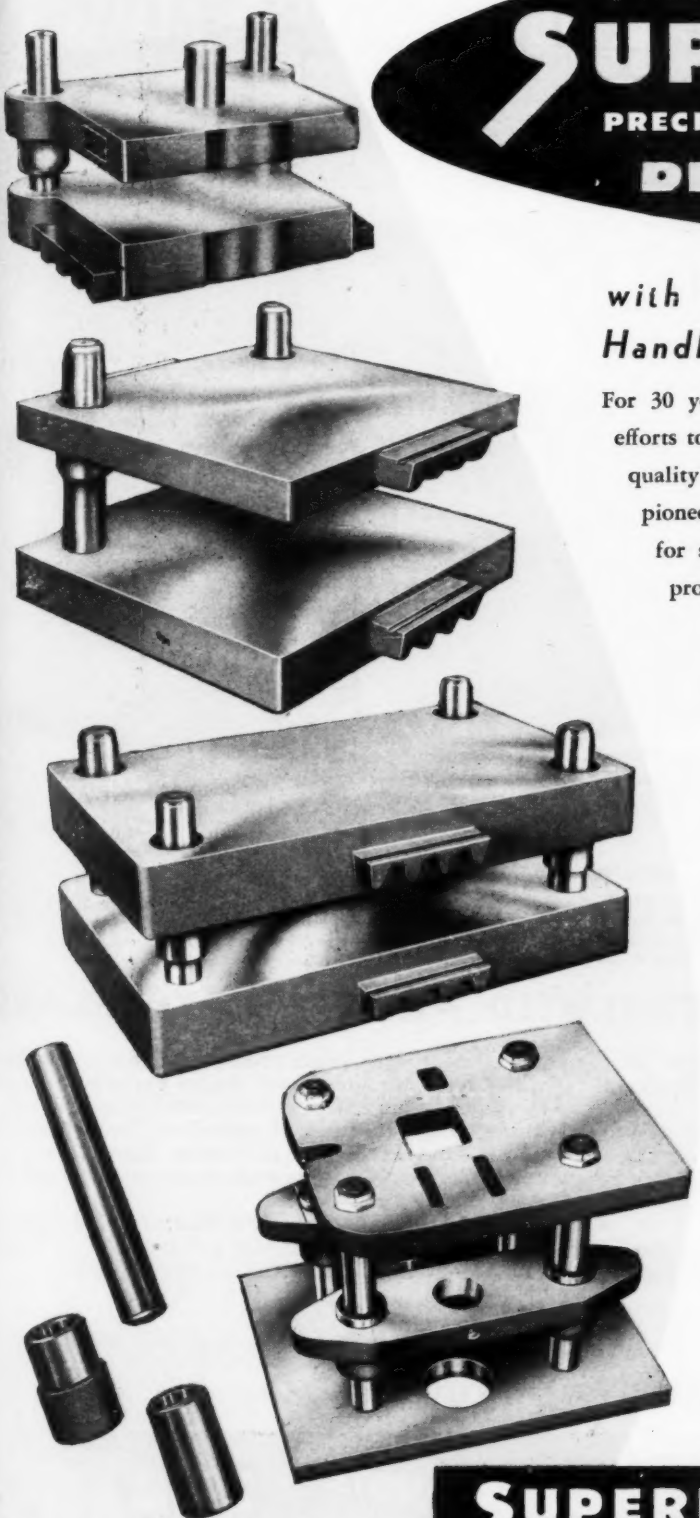

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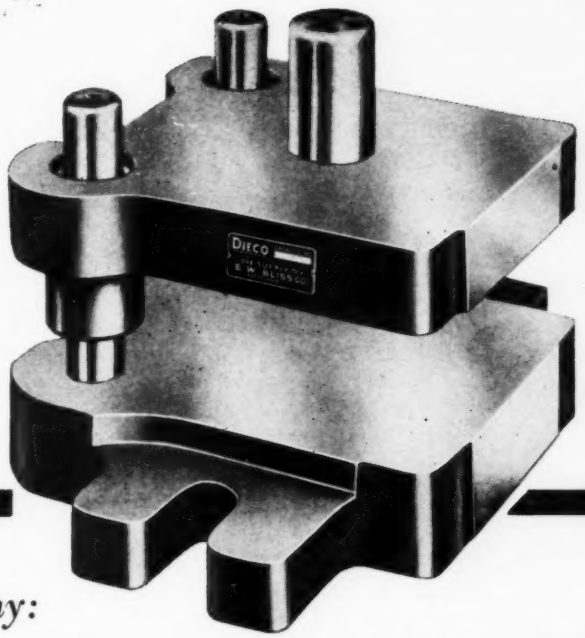

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- Hardened steel pins are rough and finish ground, then *super-finished.* Closer tolerances give more accurate guiding.
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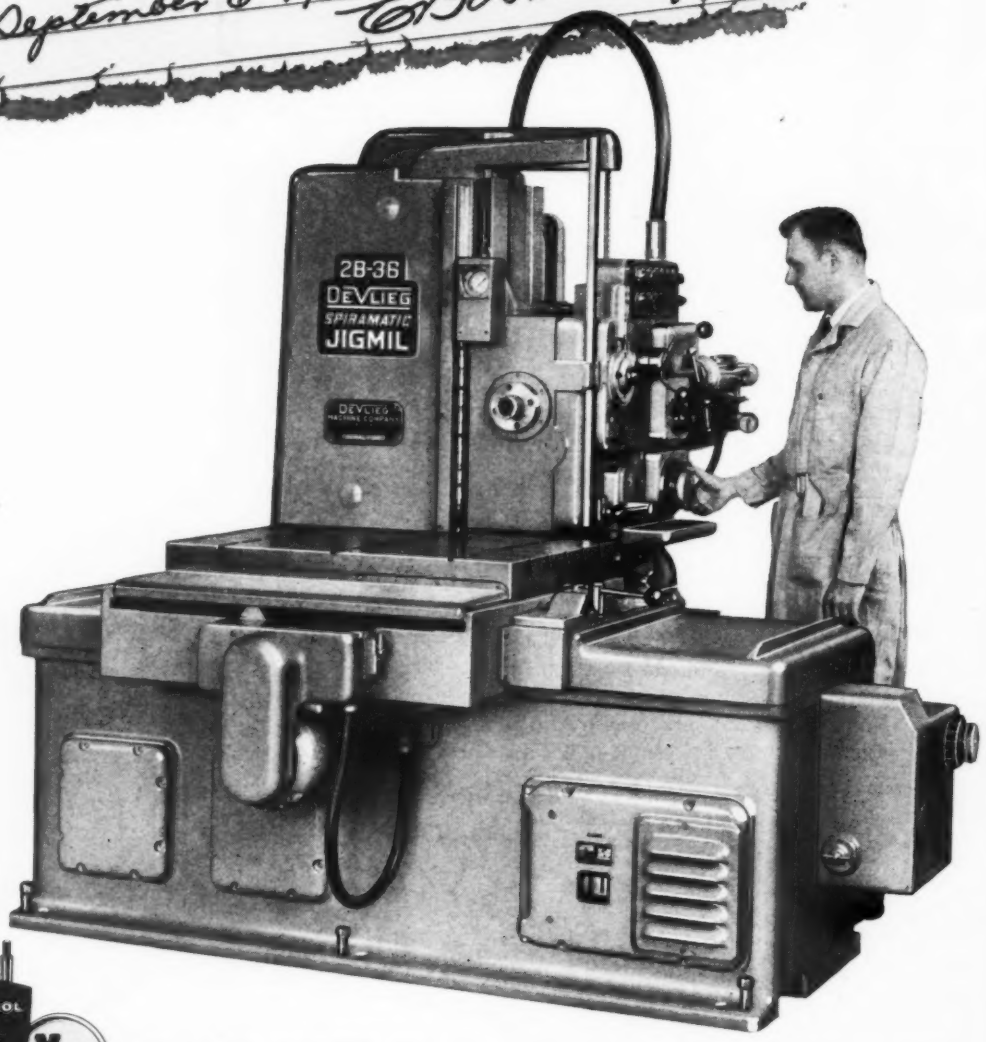

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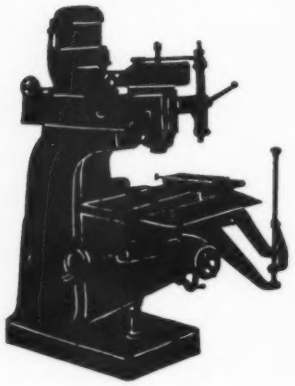
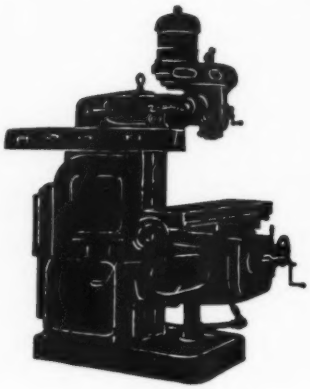
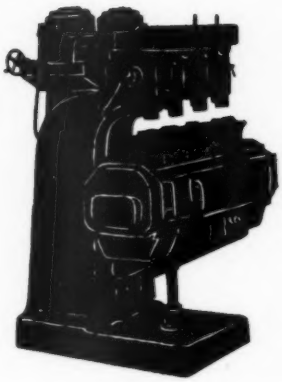
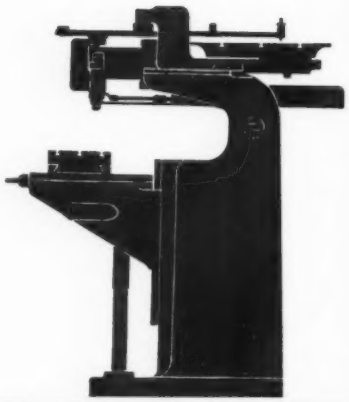
Shadows of Good Things to Come . . .









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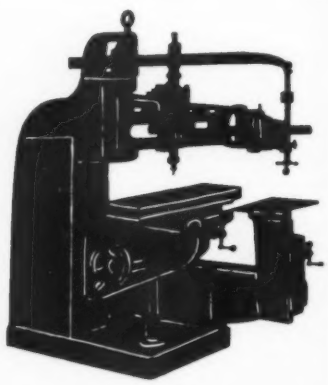

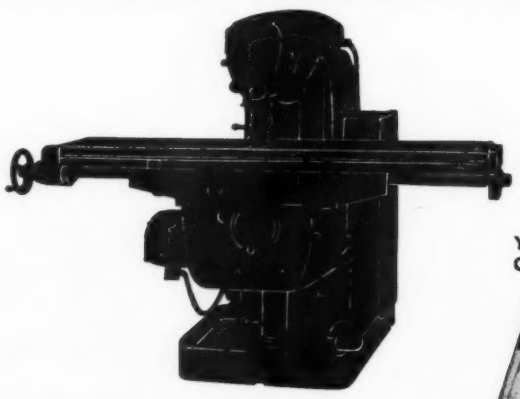

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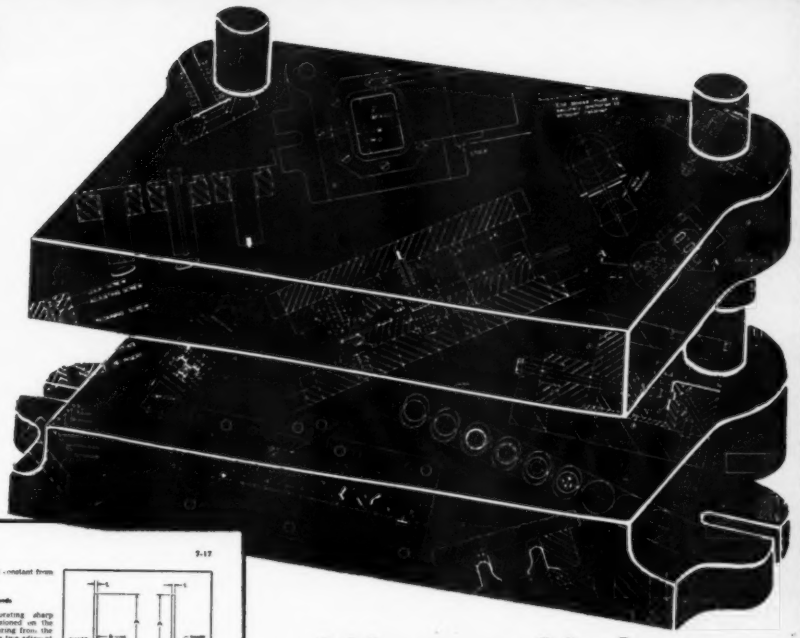

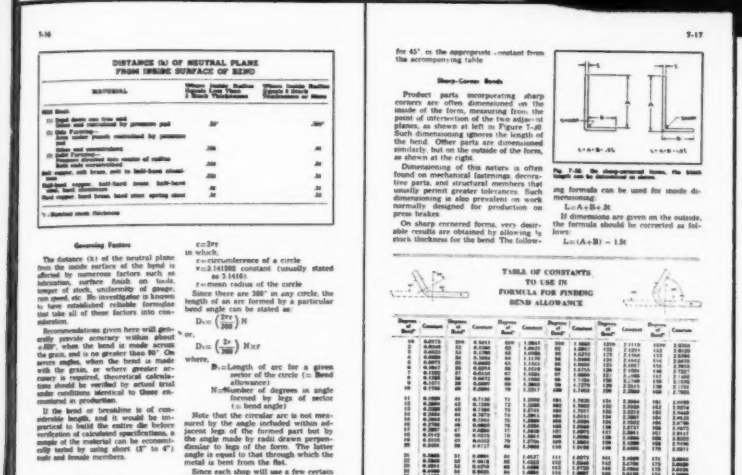

5-16

DISTANCE (b) OF NEUTRAL PLANE FROM INSIDE SURFACE OF BEND

MATERIAL	Where Inside Radius Equals 1 Thick.	Where Inside Radius Equals 2 Thick.
Cold Rolled:		
(1) Cold drawn cop. brss. and other soft material for permanent pins	.50	.500
(2) Dies Punches: Low carbon punch reinforced by permanent pin	.48	.48
Other cold rolled materials	.455	.46
(3) Cold Punches: Low carbon tool, number of outlines	.450	.46
Soft copper, soft brass, and to half-hard brass sheet	.424	.44
Half-hard copper, half-hard brass, half-hard cast, hard aluminum	.44	.44
Hard copper, hard brass, hard silver, spring steel	.44	.44

* Standard steels thickness

Governing Factors

The distance (b) of the neutral plane from the inside surface of the bend is affected by numerous factors such as lubrication, surface finish on tools, temper of stock, uniformity of gauge, ram speed, etc. No investigator is known to have established reliable formulas that take all of these factors into consideration.

Recommendations given here will generally provide accuracy within about ±.010", when the bend is made across the grain, and is no greater than 90°. On severe angles, when the bend is made with the grain, or where greater accuracy is required, theoretical calculations should be verified by actual trial under conditions identical to those encountered in production.

If the bend or breakline is of considerable length, and it would be impractical to build the entire die before verification of calculated specifications, a sample of the material can be economically tested by using short (2" to 4") male and female members.

Basic Geometry

Formulas used in finding the bend allowance (B), or length of the arc measured by the neutral plane, are based on the following geometry:

c=circumference of a circle
π=3.141592 constant (usually stated as 3.1416)
r=mean radius of the circle

Since there are 360° in any circle, the length of an arc formed by a particular bend angle can be stated as:

$$D=\left(\frac{2\pi r}{360}\right)N$$

or,

$$D=\left(\frac{\pi r}{180}\right)N$$

where,

D=Length of arc for a given sector of the circle (=Bend allowance)
N=Number of degrees in angle formed by legs of sector (=bend angle)

Note that the circular arc is not measured by the angle included within adjacent legs of the formed part but by the angle made by radii drawn perpendicular to legs of the form. The latter angle is equal to that through which the metal is bent from the flat.

Since each shop will use a few certain angles for most of their work, with 90° bends being universally common, constants can be substituted in the preceding formula:

D=constant ×r

using 1.5708 as the constant for 90°, 0.7854 for 45° or the appropriate constant from the accompanying table

5-17

Sharp-Corner Bends

Product parts incorporating sharp corners are often dimensioned on the inside of the form, measuring from the point of intersection of the two adjacent planes, as shown at left in Figure 7-26. Such dimensioning ignores the length of the bend. Other parts are dimensioned similarly, but on the outside of the form, as shown at the right.

Dimensioning of this nature is often found on mechanical fastenings, decorative parts, and structural members that usually permit greater tolerances. Such dimensioning is also prevalent on work normally designed for production on press brakes.

On sharp cornered forms, very desirable results are obtained by allowing ½ stock thickness for the bend. The following formula can be used for inside dimensioning:

L=A+B+.5t

If dimensions are given on the outside, the formula should be corrected as follows:

L=(A+B) − 1.5t

Fig. 7-26. On sharp-cornered forms, the blank length can be calculated as shown.

TABLE OF CONSTANTS TO USE IN FORMULA FOR FINDING BEND ALLOWANCE

Degrees in Angle	Constant	Degrees in Angle	Constant	Degrees in Angle	Constant	Degrees in Angle	Constant	Degrees in Angle	Constant
1	0.0175	31	0.5411	61	1.0647	91	1.5882	121	2.1118
2	0.0349	32	0.5585	62	1.0821	92	1.6056	122	2.1293
3	0.0524	33	0.5760	63	1.0996	93	1.6231	123	2.1468
4	0.0698	34	0.5934	64	1.1170	94	1.6405	124	2.1642
5	0.0873	35	0.6109	65	1.1345	95	1.6580	125	2.1817
6	0.1047	36	0.6283	66	1.1519	96	1.6754	126	2.1991
7	0.1222	37	0.6458	67	1.1694	97	1.6929	127	2.2166
8	0.1396	38	0.6632	68	1.1868	98	1.7103	128	2.2340
9	0.1571	39	0.6807	69	1.2043	99	1.7278	129	2.2515
10	0.1745	40	0.6981	70	1.2217	100	1.7452	130	2.2689
11	0.1920	41	0.7156	71	1.2392	101	1.7627	131	2.2864
12	0.2094	42	0.7330	72	1.2566	102	1.7802	132	2.3038
13	0.2269	43	0.7505	73	1.2741	103	1.7976	133	2.3213
14	0.2443	44	0.7679	74	1.2915	104	1.8151	134	2.3387
15	0.2618	45	0.7854	75	1.3090	105	1.8325	135	2.3562
16	0.2793	46	0.8029	76	1.3265	106	1.8500	136	2.3736
17	0.2967	47	0.8203	77	1.3439	107	1.8674	137	2.3911
18	0.3142	48	0.8378	78	1.3614	108	1.8849	138	2.4086
19	0.3316	49	0.8552	79	1.3788	109	1.9023	139	2.4260
20	0.3491	50	0.8727	80	1.3963	110	1.9198	140	2.4435
21	0.3665	51	0.8901	81	1.4137	111	1.9373	141	2.4609
22	0.3840	52	0.9076	82	1.4312	112	1.9547	142	2.4784
23	0.4014	53	0.9250	83	1.4486	113	1.9722	143	2.4958
24	0.4189	54	0.9425	84	1.4661	114	1.9896	144	2.5133
25	0.4363	55	0.9599	85	1.4835	115	2.0071	145	2.5307
26	0.4538	56	0.9774	86	1.5010	116	2.0246	146	2.5482
27	0.4712	57	0.9948	87	1.5184	117	2.0420	147	2.5656
28	0.4887	58	1.0123	88	1.5359	118	2.0595	148	2.5831
29	0.5061	59	1.0297	89	1.5533	119	2.0769	149	2.6005
30	0.5236	60	1.0472	90	1.5708	120	2.0944	150	2.6180

* Angle formed by radii from sharp perpendicular to legs of bend.

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Honors and Achievements . . .

● C. G. A. Rosen, president of the Society of Automotive Engineers, has been awarded an honorary Doctor of Science degree by Bradley University, "in recognition of his pre-eminence in the field of science and engineering throughout the world." He is one of the developers of the diesel engine.

● Dr. Kent R. Van Horn, director of research for Aluminum Co. of America, now holds an honorary Doctor of Science degree from Case Institute of Technology. Well known through metallurgical and metal research circles, Dr. Van Horn is an authority on industrial X-ray.

● Richard L. Templin, assistant director of research for Alcoa, has been awarded an Honorary Membership in the American Society for Testing Materials, the highest award the Society bestows.

● The Research Institute of America's 1955 prize award for merit for an outstanding contribution to the betterment of labor-management relations in industry has been earned by the Morse Twist Drill and Machine division of the Van Norman Co., New Bedford, Mass. The award was based on a case history report of the system of effective communication beween the company's management and its employees.

Automation Program Launched . . .

● Machine tool automation represents a highly specialized field, requiring the development of specialized products and techniques, according to Glenn E. Seidel, vice president of engineering at Minneapolis-Honeywell Regulator Co. A long-range program to develop automatic control devices and systems for machine tool automation was undertaken at M-H recently with the formation of a new Machine Control Group. The Group's first development was a punched-tape type electronic control system for converting precision boring machines to automatic operation. Watch for more developments by this Group!

● Temco Aircraft Corp. is now subcontracting for over $1,000,000 worth of three separate assemblies for the North American F-100D Super Sabre. The subcontracts were awarded by North American on the basis of lowest bid presented.

● Colonial Broach & Machine Co. is the new name of Colonial Broach Co., Detroit.

Erickson Tool Company, Cleveland, has purchased The E. Westberg Corporation of E. Syracuse, N. Y. All patents, designs for which patents have been applied, special production equipment, manufacturing and sales rights to the line of Westberg "Collectmandrels" were acquired by Erickson and will now be manufactured by Erickson in Cleveland and marketed under the Westberg name.

◆

A. Landau Company and Louis A. Sgro Company, two prominent Philadelphia manufacturers of diamond pointed tools, joined forces last month. The newly-formed A. Landau Company is headed by Herman E. Landau and Louis A. Sgro is vice president.

◆

Vulcan Crucible became the twelfth division of H. K. Porter Company, Inc., as a result of Porter's purchase of The Vulcan Crucible Steel Company.

◆

American Brake Shoe Company, large manufacturers of railroad equipment and industrial products, has purchased The Denison Engineering Company, a leading manufacturer of hydraulic presses, pumps, and automatic controls. Denison is now a wholly-owned subsidiary of Brake Shoe and no changes in management or operations are contemplated.

◆

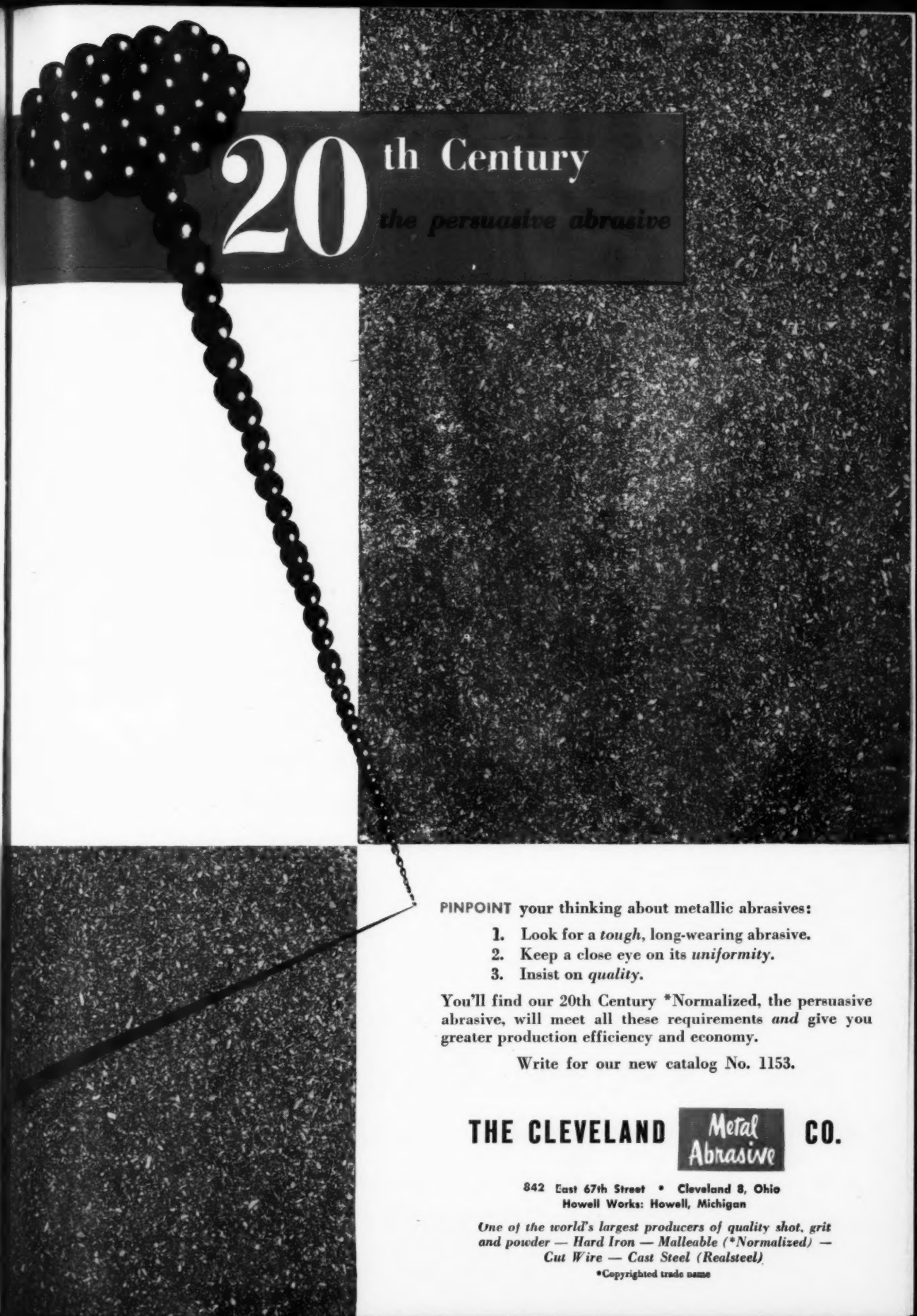
Plans are under way to merge the operations of Perfection Industries, Inc., with those of Hupp Corporation. Perfection has two plants in Cleveland and one in Waynesboro, Ga.

◆

"To better meet industry's growing acceptance of Speed-D-Burr barrel finishing equipment and to offer an expanded job shop service," the Speed-D-Burr division of Miller Machine Tool & Gauge Company, Glendale, Calif., is now known as Speed-D-Burr Corporation.

◆

As a result of Wyman-Gordon Company's purchase of a substantial interest in the Prex Corporation, the productive capacity for the manufacture of small and medium-size Prex forgings will be greatly increased. At the same time, Prex's techniques for producing small light alloy forgings without draft and with thinner sections and closer tolerances will be applied in producing large forgings on the heavy presses Wyman-Gordon operates in the Air Force Heavy Press Program.



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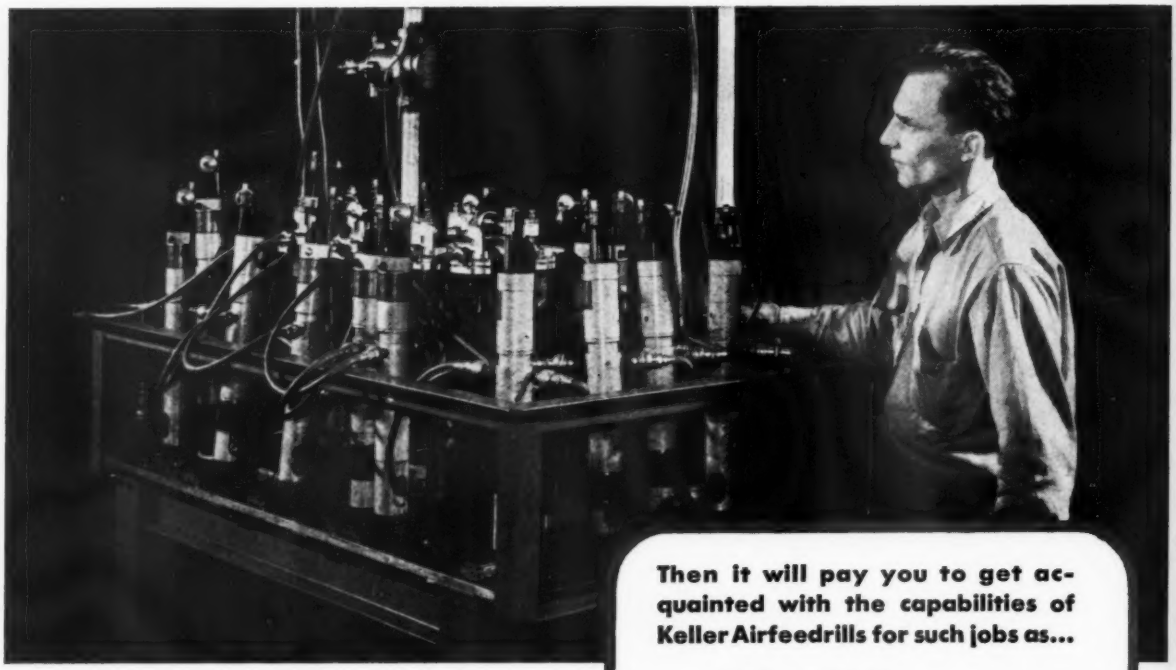


A typical automatic production setup using 14 Keller Airfeedrills. Pressing a single control valve drills 14 holes simultaneously in a refrigerator outer shell assembly—the drills advance, drill, retract, and shut off automatically.

■ These remarkable tools work without supervision, and take the place of expensive machines in automation setups. They are entirely air controlled and operated, automatically cycled, and extremely accurate.

■ Among the special advantages available are sensing type rapid advance, hydraulic feed control, and adjustable torque control. Thus they are able to do peck drilling, skip drilling, and other jobs that heretofore have required expensive machine tools.

■ Write and tell us about your machining problems. We will send appropriate bulletins or have a representative call to discuss Keller Air Tools.

Then it will pay you to get acquainted with the capabilities of Keller Airfeedrills for such jobs as...

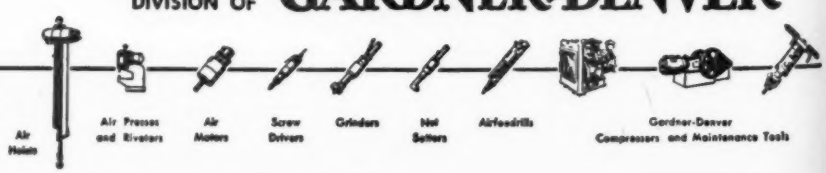
- **DRILLING**
- **REAMING**
- **COUNTERSINKING**
- **TAPPING**
- **CENTER DRILLING**
- **CHAMFERING**
- **COUNTERBORING**
- **SPOTFACING**

GARDNER-DENVER Since 1859 K KELLER TOOLS

KELLER TOOL

DIVISION OF GARDNER-DENVER

GRAND HAVEN, MICHIGAN



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SUPERFINISH BORES REDUCE TOOL WEAR
KNURLED HEADS PROVIDE GOOD GRIP
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industry's standard of quality and service
100% CONCENTRICITY AND HARDNESS TESTS INSURE ACCURACY
BLENDED RADIUS HELPS PREVENT TOOL HANG-UP
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH MICHIGAN
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Universal Drill Bushings are available in a complete range of standard sizes and lengths. Special sizes made to order. Vastly increased production facilities assure immediate deliveries. Write to the office nearest you, Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

Universal products include: Standard Collet Chucks, Floating Collet Chucks, Boring Chucks, "Kwik-Switch" Tool Holders, Mikro-Lok Boring Bars, Standard Drill Bushings, and Universal Index Plungers. Write for catalog.

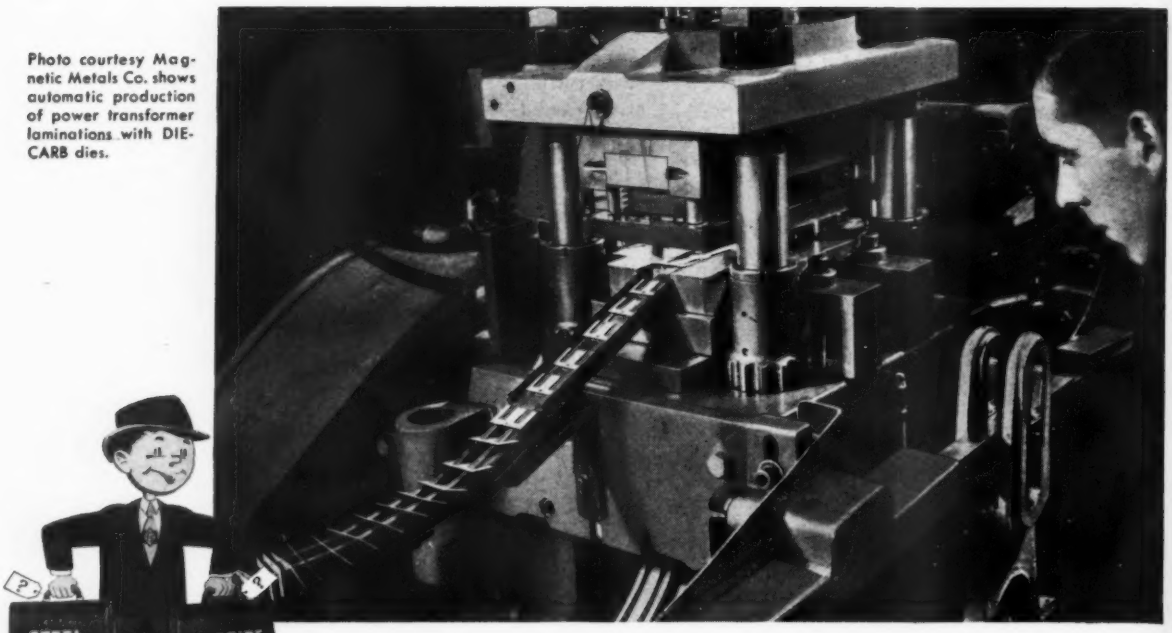
189

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 61

Photo courtesy Magnetic Metals Co. shows automatic production of power transformer laminations with DIE-CARB dies.



Mr. Tooley Says:

"There are two sides to every question"

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HIGH CHROME STEEL

- Tougher edge
- Better edge wear
- Safe to heat treat
- Easier to machine

DIECARB

THE HIGH PRODUCTION CARBIDE

- Made expressly for blanking and lamination dies.
- High resistance to shock and abrasion.
- Low regrinding cost.
- Greater production per die life.

The question of which die material to use for blanking and laminating operations involves a choice of either *steel* or *carbide.* Consideration must be given to the factors which determine die life, such as abrasiveness of the material to be worked, burr limit, distortion of product or elimination of subsequent machining operations.

In the selection and purchasing of die materials, Firth Sterling offers you *unique* advantages because it manufactures *both* steel and carbide. From *one* dependable source of supply you are assured of completely *un*biased recommendations and the *right* steel or carbide or *both* for every die making need.

Typically, Firth Sterling DIECARB and Firth Sterling CROMOVAN (die steel) are widely used for blanking and laminating operations, depending upon job requirements. Write today for literature and unbiased recommendations for your specific needs.

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R-310

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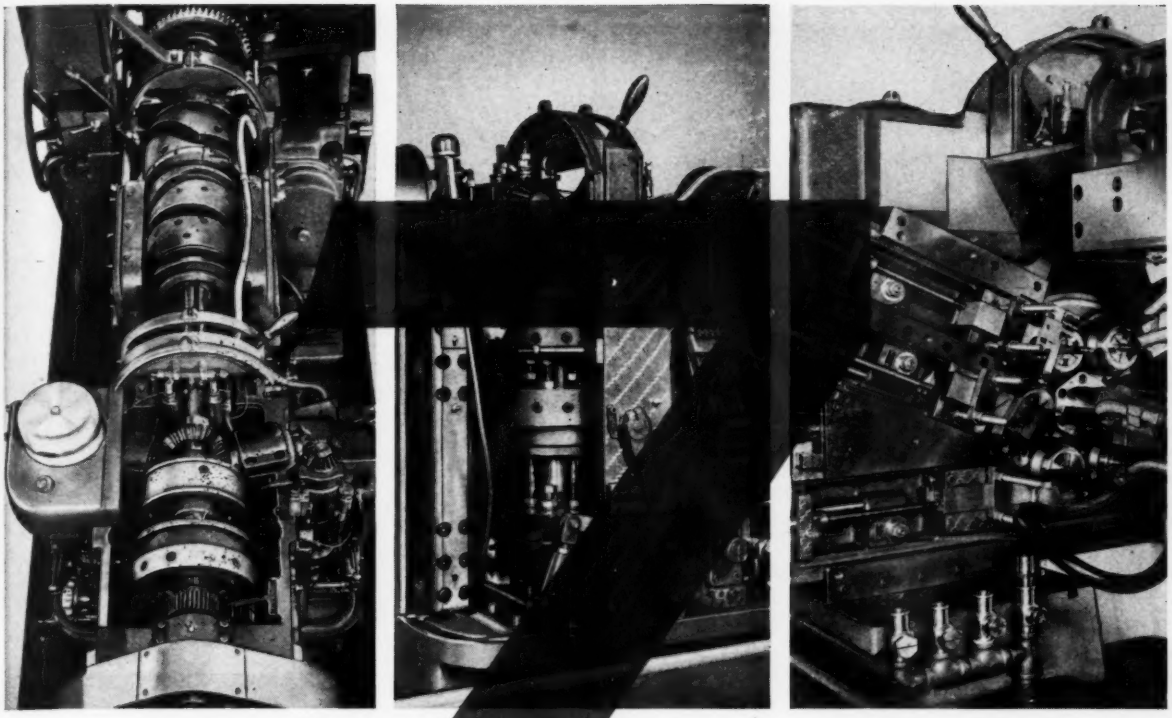
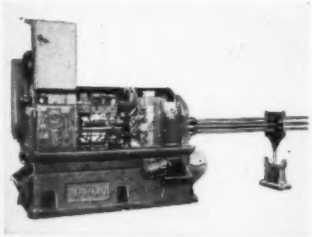


Seven Fast Changeover Models

With the prospects of improved tool materials ever decreasing the actual machining time of work on Multiple Spindle Automatics, long runs tend to become short runs. Facility that decreases the time for job changes becomes more important to low-cost production.

Conomatics are available in as many as seven fast changeover models. These are the 9/16", 1", 1⅝" Sixes, and the 2⅝", 3½", 5", and 5¼" Fours.

These models are equipped with dial adjustment of working stroke of all slides, without making necessary change of total stroke or positive stop settings. Write, wire, or phone for literature descriptive of these features and other facilities available to users, or prospective users.



Conomatic

THE MACHINE TOOL SHOW CHICAGO, ILL. BOOTH 401

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.

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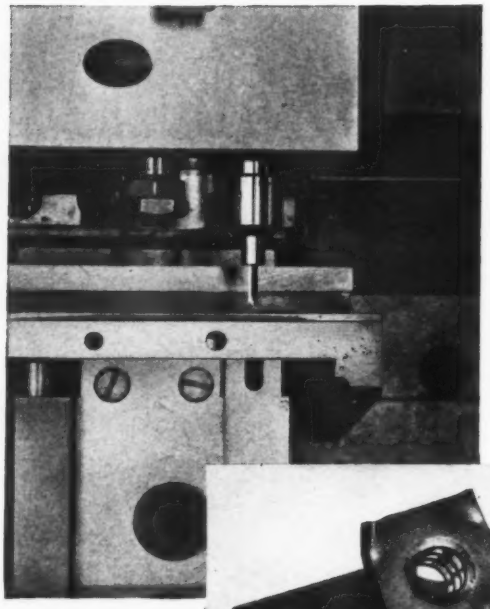
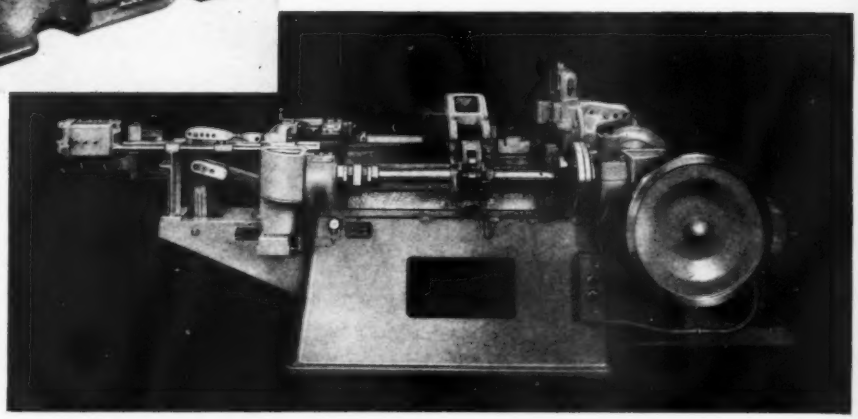


Now! In addition to trimming, piercing, swaging, embossing, blanking and forming . . . .

TAPPING on the U. S. MULTI-SLIDE®

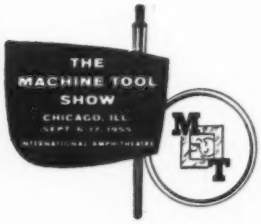


Top: Close-up top view looking down into tapping position on the U. S. Multi-Slide.

Above: Allen-Bradley Coil Terminal produced complete on No. 33 U. S. Multi-Slide, including tapping a 6-32 hole. Shown about three times actual size.

Right: Standard No. 33 U. S. Multi-Slide Machine which is used (with the addition of a tapping head) for the production of the part shown above.

See this equipment in operation at BOOTH 215, MACHINE TOOL SHOW, International Amphitheatre, Chicago, Ill., September 6-17, 1955.



The Allen-Bradley Company of Milwaukee, Wisconsin, manufacturers of quality motor controls, will install in their plant a No. 33 U. S. Multi-Slide Machine equipped with a tapping head to produce the Coil Terminal shown above *complete including the tapping of a 6-32 hole.* The incorporation of tapping in the U. S. Multi-Slide eliminates the need for a secondary operation on this part.

The U. S. Multi-Slide is designed and built for the automatic production of stampings, and any or all of the following operations may be incorporated to produce complete parts at each stroke of the machine: trimming, piercing, swaging, embossing, blanking and forming. Now the possibility of including a tapping operation further increases the versatility of the Multi-Slide, and offers to the user increased potential for cost reduction by eliminating secondary operations and handlings.

Bulletin No. 15-P contains complete specifications. Write for a copy.

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers

U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

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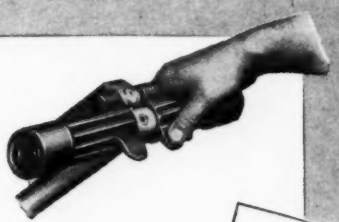
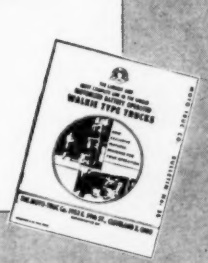
Less Idle Time WITH MOTO-TRUC*

* To make an investment in a lift truck is one thing . . . to make it *pay* is another. The amount of idle time logged against a truck is a major factor in whether a truck is "paying its way."

MOTO-TRUCS offer *LESS* Idle time because of simplified operator controls. Their patented *Roller Grip Controls* make it easy for practically anyone in your plant to operate the truck . . . and remember . . . There's a MOTO-TRUC for every purpose.



Simplified Roller Grip Controls



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Pallet . . . Platform . . . Hi-Lift Trucks

LARGEST EXCLUSIVE MANUFACTURER OF "WALKIES"

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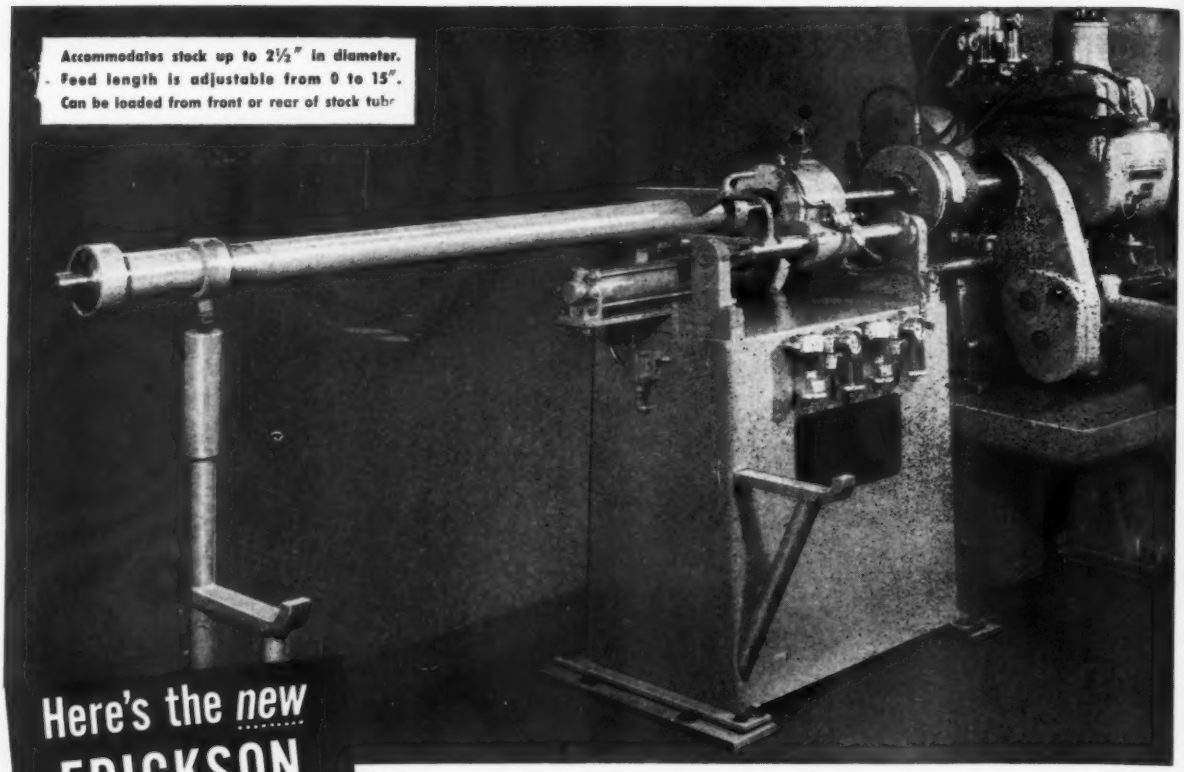

Accommodates stock up to 2½" in diameter.
Feed length is adjustable from 0 to 15".
Can be loaded from front or rear of stock tube

Here's the *new* ERICKSON PNEUMATIC BAR FEED!

...An Automatic Air Stock Feed and Collet Operating Unit Designed to Operate with any Collet Equipment

● *Increases production* ● *Reduces operator fatigue*

THIS NEW ERICKSON Stock Feed automatically feeds bar, hex or tubing stock to your machine tools for rotating or non-rotating machining operations. It is an air-powered, fully automatic unit which is quiet, simple to operate, safe to use, rugged and dependable. It can be used with any type of collet equipment.

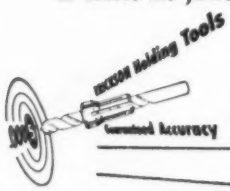
EASE OF OPERATION reduces operator fatigue and speeds set-up cycle time. One valve controls entire operation. At a flick of the valve handle, spindle collet opens and feed chuck advances stock to preset length; feed chuck then opens its jaws. Another flick closes spindle collet on stock and returns feed chuck to its starting position where it closes its jaws on stock to give double grip.

AA-976

OPERATIONAL ADVANTAGES

- Assures positive movement of stock. No dragback of stock on return stroke.
- Adjustable feed chuck jaw pressure eliminates marring or crushing of stock while providing positive grip.
- Permits use of exact size, polished stock.
- Provides double grip on stock to resist "pushback".
- Stock feed is adjustable to suit cycle time and bar size.
- Stock moves with spindle rotating to reduce cycle time.
- No safety controls needed due to basic design.
- Filler tube is supported over its length by ball bearings in stock tube. It rotates with stock to prevent marring, eliminate chatter.
- Rugged welded base construction rigidly supports feed chuck, dampens vibration, reduces whip, guaranteeing smoother finishes, quiet operation.

For complete information on the new Erickson Pneumatic Bar Feed, send for your copy of Circular K-2 today!



ERICKSON TOOL COMPANY

2301-8 Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 66

"your future dividends"

Over the years the National Machine Tool Builders' Association has done a tremendous educational job in relating the machine tool to the successful workings of free enterprise and to our rapidly rising standard of living. The messages have gone widespread throughout industry and educational circles. Some, but not enough, have enjoyed distribution to the consuming public via the daily press and other mass circulation media.

A unique opportunity now presents itself for the machine tool builders to dramatically relate the use of their products to John Q. Public's pocketbook.

No longer can the consuming public be looked upon by the capital goods industries as a remote, inanimate statistic. When we consider the phenomenal growth in the number of shareholders in American business by virtue of the highly-publicized and mushrooming stockholders clubs, neighborhood investment groups and individual investors, we are struck by the realization that each and every one of these members of the consuming public has a newly-acquired right to put pertinent questions to the managements of the industries in which they have become shareholders.

"Do you have a plant modernization program?"

"Are you limping along with prewar machine tools?"

"Are you using my money to cut costs — increase profits — meet competition — survive?"

Such questions from flesh and blood stockholders can jar the most complacent managements into action.

How can these people be impelled to ask about new machine tools if they don't know that such cost-cutting, dividend-earning machines are available?

A stage will soon be set which will enable the machine tool builders to implant those questions in the minds of thousands upon thousands of investors, large and small. This is the NMTBA's Machine Tool Show at the International Amphitheatre in Chicago, September 6 to 17th. It is to be a dynamic, working show with hundreds of tomorrow's machine tools in operation demonstrating their ability to pay dividends.

What a natural setting for a movie production to show American shareholders what it takes to keep their dividends coming along! The film could be produced, edited, and duplicated for showing before chambers of commerce, luncheon clubs, parents and teachers groups, investment clubs, schools and colleges, and society meetings—audiences made up of a higher percentage of stock-owning partners in American business than has ever before existed . . . and a rapidly growing percentage.

There the machines will all be . . . and under one roof. Through no other circumstances could a machine tool film be produced for such a minimum outlay for staging and travel. The exhibits will be spectacular in themselves, maintained in apple-pie order, yet doing business (making chips, grinding surfaces, boring holes, forming metal sheet) under a full head of steam.

Many of the exhibitors would use "shorts" from the film in their own sales promotion subsequent to the show. Appropriate parts could be edited with an eye toward distribution through newsreel channels.

The morning and evening hours when the show floor will be free of milling throngs would be a field day for the camera men, although some "atmosphere" shots should include the record-breaking attendance.

Interviews could be arranged with prominent industrialists attending the show, disclosing their procurement programs. Some would not be allergic to pointing out machines they had ordered for their (stockholders') plants.

Surely, somewhere, there is the man or concern with dramatic vision and film production experience who could take this idea and come up with a great industrial classic.

It is the machine tool builders' made-to-order opportunity to tell and show the increasing thousands of industry owners that here are "your future dividends."

E. Willard Pennington

editor

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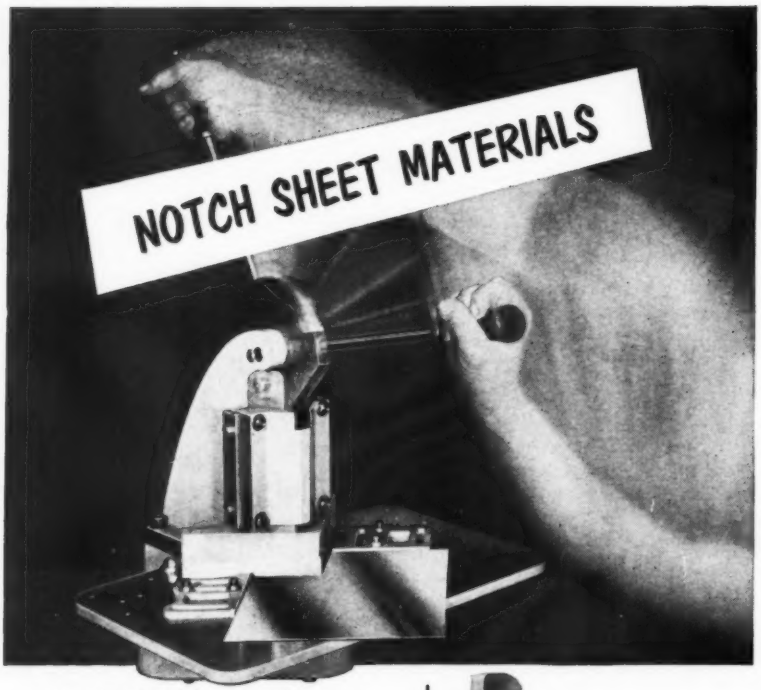

Do It Quickly, Easily with a DI-ACRO* NOTCHER

Speed up notching operations, eliminate the need for heavy presses and dies. A 6" x 6" notch is made in 16 guage material in one operation. Also perform many straight shearing jobs.

*Pronounced DIE-ACK-RO

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Send for 32-Page Catalog Today.

See 2 Di-Acro Exhibits at Chicago, Sept 6-16; Production Eng. Show, BOOTH 125-126, Navy Pier. Metalworking Show, BOOTH, 653, Chicago Coliseum

DI-ACRO POWER NOTCHER

Especially designed for operations where a high rate of production must be maintained. Motor driven flywheel and all moving parts housed in a welded, steel cabinet.

di-acro PRECISION *METALWORKING MACHINES

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drawing a 2-diameter motor cover and the design of a special slotting die for producing continuous slots are described by Mr. Ehrich.

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With Continental Standard Drive Holders you can change cutters with a *twist of the wrist* no matter how severe the operation has been. This will save you time and save your tools.

It is as simple as this: The Continental Standard Drive consists of integral double driving lugs on the shank of the cutter which engage double abutments in the socket of the holder. Double aligning bearings keep the cutter and holder in rigid alignment. The drive is machined from the solid—there are no pins or loose details. Result—a balanced, positive drive which is non-wedging and practically indestructible.

Order through your Ex-Cell-O representative or direct from the Continental Tool Works in Detroit.

Continental Counterbores may be purchased individually or in sets. Write on your company letterhead for Catalog 60681.

Continental

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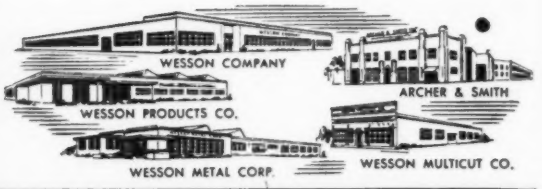
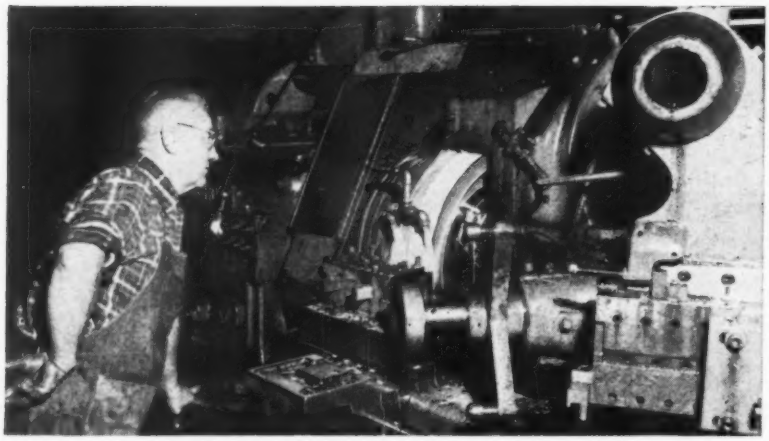
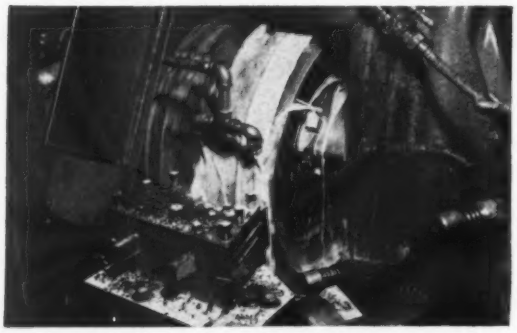
carbide NEWS



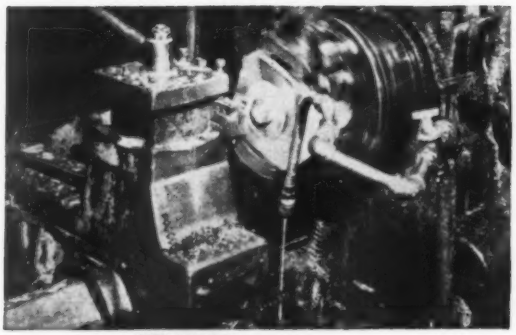
New Grade 26 Nearly Universal



Straddle facing the O. D. of a forged steel final drive gear on a 4F Gisholt Fastermatic lathe using Wessonmetal Grade 26. Tool life increased 40% over other carbides.



Closeup of straddle facing operation. Two solid carbide Grade 26 inserts are used. Job is being done at 260 sfm and 40 rpm. Feed varies from .017" to .020" with average depth of cut from 3/16" to ¼".



Grade 26 produced a 30% increase in tool life on a severe interrupted cut on a tractor brake band anchor. Standard Wesson band-type Multicut is used on a Warner & Swasey turret lathe. Cutting speed ranges from 280 sfm down to zero. Feed is .027", depth of cut is ⅛".

Useable on 95% of steel cutting operations, it boosts tool life 40%

The nearest approach to a universal cutting grade available to the metalworking industry is a new carbide designated as "Grade 26" by Wesson Metal Corporation. Created primarily for all types of steel rough and semi-finish machining, it is also proving highly effective on some finishing operations.

Problems of carbide selection are greatly simplified by Wessonmetal Grade 26, since it cuts down the number of grades required for steel cutting operations by as many as four grades.

Optimum performance for Grade 26 extends over a range of 100 to about 400 sfm, covering 95% of steel machining operations encountered in industry today.

Much of Grade 26's record of outperforming all other steel cutting grades in 95% of all machining operations on which it has been applied is due to its superior edge cutting strength. Grade 26 was developed to have high red hardness and high thermal conductivity in order to function without any drop in performance at the elevated temperatures generated at high cutting speeds.

Improvement in tool life over all other grades has averaged about 40% on applications to date. Extensive tests have been conducted on a wide range of materials ranging from conventional steels to the high alloys used in high temperature applications.

Now in full production at Wesson Metal Corporation's new metals plants in Lexington, Ky., Grade 26 provides the answer to lower tool costs over a broad range of metal cutting operations.

For answers to your machining problems write:
WESSON COMPANY
DEPT. AD
1220 Woodward Heights Blvd.
Detroit 20, Michigan.

tools Wesson carbide Wessonmetal

CIRCLE INFORM-A-GRAM KEY NO. 70

EPOXIES FOR TOOLS AND DIES

by Benjamin Sokol
Chief Plastics Engineer
REPUBLIC AVIATION CORPORATION
Farmingdale, N. Y.

DURING THE PAST FIFTEEN YEARS the use of plastics in tooling has increased by leaps and bounds. Today, many types of plastic tools and dies are suitable alternates for applications where metal dies were once the only answer. And in some of these cases the metal dies have been completely replaced.

Why have plastic dies been received with so much favor? There are several answers to this question. Plastic tools can be made quickly, accurately, and with a minimum of tools and equipment. No highly skilled labor is needed; methods are so simple that almost anyone, with a minimum of training and experience, can turn out an acceptable die. In fact, if you can mix a can of resin and hardener, and wield a paint brush, you can fabricate your own tools and dies.

The finished product is light in weight, and therefore easy to handle. Repairs or design changes can often be taken care of while the die remains in the press; even if the die has to be removed it is usually unnecessary to start all over and make a new one. All this adds up to a large reduction in man-hours needed — and time saved is as good as money earned.

Aviation companies are perhaps among the largest users of tools and dies, and the Republic Aviation Corporation is no exception. During the course of a year, we may build as many as 1000 patterns; about 2500 form, draw, drop hammer, and steel rule dies; more than 1500 stretch forms, molds and press blocks; and any number of trim, drill, welding, routing, spotting, and checking fixtures. By using Epon* resins and very simple laminating and casting techniques, we have cut the cost of certain tools by as much as 60% compared to building them out of metal. In some cases, as for example with drop hammer dies requiring extensive and tedious hand grinding to the design contour, our savings have been even greater.

These savings are easily demonstrated. Consider the case of a stretch die, requiring 50 cu ft of either a high-zinc alloy or epoxy resin

*Reg. Trademark, Shell Chemical Corp.

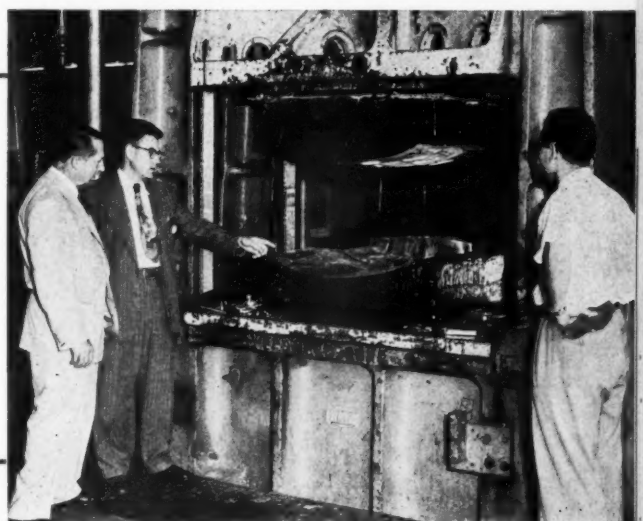


Fig. 1. Epon resin and glass cloth were used to give this drop hammer die a hard, long-wearing surface. The die was backed with a polyester-glass mix and mounted on a steel base plate. Shown with author Sokol are A. Bringewald, Chief of Manufacturing Research & Development (left) and plastics engineer P. Rosenberg (right).

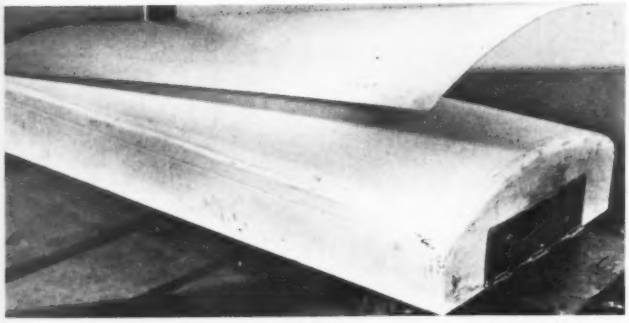
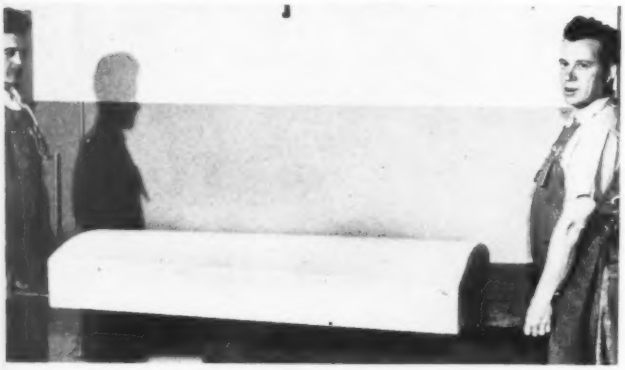


Fig. 2-A. This hollow epoxy stretch form shapes fusilage skins out of 0.064" 24ST aluminum for the Republic Thunderstreak. Steel angles are embedded for mounting on the press.

formulation, two of the materials which are highly satisfactory for the purpose. The metal weighs close to 430 lbs per cu ft and costs about 18 cents per pound. The filled Epon resin 828 casting formulation costs approximately 65 cents per pound but weighs only 75 lbs per cu ft. Simple arithmetic then pegs the cost of only the metal for the die at $3,870; the calculated resin cost, on the other hand, is only $2,438, resulting in a **saving of more than $1,400 for materials alone.** Add to that the fact that our epoxy die may be built hollow and may have only one-twentieth the weight of a solid metal die; remember that no heating facilities (melting pot) will be needed for the plastic die; and bear in mind that the plastic die may be cast against a pattern and requires no machining — then the cost and time saving factors take on even greater significance.

The zinc-base die metal does have one advantage, which is that it may be reused. However, in actual practice there is a general reluctance to melt down dies which cost so much to prepare, and they are kept in storage on the off chance that they may be needed again. This thinking ties up a lot of cash in inventory and is another reason why we are switching to plastic dies wherever possible.

Fig. 2-B. One of the prime advantages of plastics tools is their light weight. This stretch form (Fig. 2-A), weighing only 152 lbs, is easily carried by two men. The same tool made from the usual zinc-base alloy would weigh more than 3000 lbs.



Plastics We Have Used

Polyesters and phenolics were among the first types of resins to be used for tools, dies, and fixtures. Originally the resins were used alone, but later it was found that reinforcement with glass cloth permitted new techniques and generally increased the strength and durability of the finished product.

Phenolics, though low in cost, have three disadvantages which limit their usefulness. (1) they shrink considerably in curing, making it difficult to maintain close tolerances. (2) after a relatively short time completely cured phenolic dies may exhibit considerable creep and distortion, rendering them unfit for further use. (3) the catalyst used to cure phenolics is generally acidic and, since it remains in the die, may cause corrosion of metal with which it comes into contact. It is therefore necessary to neutralize the die surface continually as the acid works its way out of the die, or to use the die only in contact with acid-resistant or lacquer-coated metal.

Fig. 2-C. Underside of stretch form shown in Fig. 2-A. Epon resin-glass cloth laminate, 3/8" thick, was used for the walls, with longitudinal reinforcements of 1" hardboard.

In our search for better plastics out of which to build our tools and dies, we some time ago set up specifications for an ideal material. These are the characteristics we hoped it would some day have:

1. Stable—non-shrink in cure, weather resistant, inert in acids, alkalies and all common solvents and oils. No dimensional change with time (low creep).

2. Tough and hard (Barcol 95), but modifiable to the resilience of 40 Durometer rubber. High impact strength.

3. Physical properties:

(Unreinforced)	
Compressive Strength	60,000 psi
Tensile Strength	60,000 psi
Modulus of Elasticity	6×10^6
(Reinforced)	
Compressive Strength	100,000 psi
Tensile Strength	100,000 psi
Modulus of Elasticity	10×10^6

4. Heat resistant—high heat distortion temperature (350°F), non-flammable, low thermal coefficient of expansion.

5. Controlled cure at room temperature with a low exotherm.

6. Can be cast or laminated; can be mixed with other resins and fillers to obtain different properties.

7. A good adhesive.

8. Low in specific gravity (1.0) and low in cost per pound.

We realize that's asking a lot, and we haven't found our ideal yet. But the epoxy resins which we have been using for the past two years come mighty close to it.

Starting with a laminating formulation based on Shell Chemical's Epon resin 828 and cured with diethylene triamine, we can achieve a diversity of physical properties which is almost amazing. Depending on the other components we add, we may end up with a material which will exhibit any of the following properties: (a) a hardness of Barcol 35 after 6 hrs, Barcol 45 after 12 hrs; (b) Barcol 20; (c) no Barcol reading at all; in fact the material is so soft that you can dig your fingernail into it, yet so tough that it withstands the pounding of a hammer; (d) an extremely hard, wear-resistant surface with a hardness of Barcol 90; or (e) toughness, a certain amount of malleability and high heat resistance, combined with metallic appearance.

Tools and Dies We Have Built

Epoxies have been used for a wide variety of tools and dies, all of which may be grouped into one of three categories:

1. **Master tools:** Kellering patterns, models, master and duplicate patterns, master forms.

2. **Cutting and forming tools:** Steel rule dies, form dies, stretch forms, molds, press blocks.

3. **Fixtures:** Spotting, checking, or assembly fixtures; drill, trim, routing, or welding fixtures.

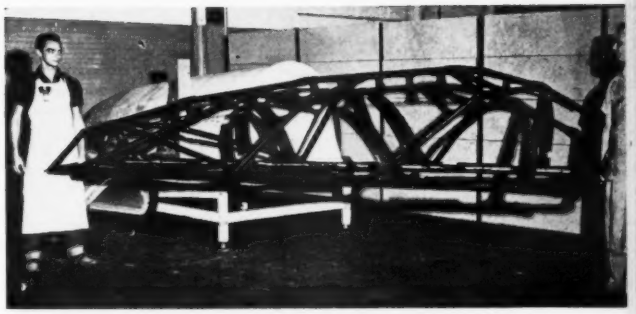


Fig. 3. Seventy-five pounds is the weight of this contour checking fixture, built with an epoxy-glass cloth laminate over paper-based phenolic tubing.

Either cast epoxies or laminated epoxies (Epon resin reinforced with glass cloth) may be used, the choice of method depending on the tool being built. Almost all the items in group 1 will generally employ casting resins. The resin, including room temperature curing agent, is cast against an inverted model of a master pattern, which may be of wood, plaster, or any other conventional modeling material. When the cast resin has hardened you have a pattern, true in every slightest detail to the original. The same general procedure may be used to cast stretch forms, press blocks, etc., to the shape of a wooden or plaster model.

Where higher strengths are needed, the lay-up method is preferred. Starting with a model of the die you want to build, you first make an inverted pattern. Then you drape epoxy-impregnated glass cloth over the inverted pattern and brush additional epoxy resin over it. Room temperature curing is generally satisfactory. When the first ply of glass and resin has become tacky, the second layer is applied, and again resin brushed over it. This procedure is repeated until the lay-up has reached the desired thickness, which is usually at least ⅛". The completed lay-up should be allowed to cure overnight, preferably 24 hrs, after which it may be removed. In all of this work — also in casting — parting agents must of

Fig. 4. This form block is comprised of a hardboard base, a cast phenolic body, and a restriction plate made from a polyester-glass cloth laminate. Blank of ⅛" aluminum (left) has been formed (right) and hand finished (extreme right).

Fig. 5. The polyester laminated drill rack shown here was used for seven years of Thunderjet production. Drill racks currently used for Thunderflash were made with Epon resin rather than polyester.

course be used because the epoxies are highly adhesive and will stick to almost anything.

When the reinforced epoxy die shell has been completely cured and lifted off, it may be backed up or filled with other resins, or it may be braced with structural materials. Steel I-beams or angle irons may be imbedded. Where less strength is required, transverse members of hardboard serve very well.

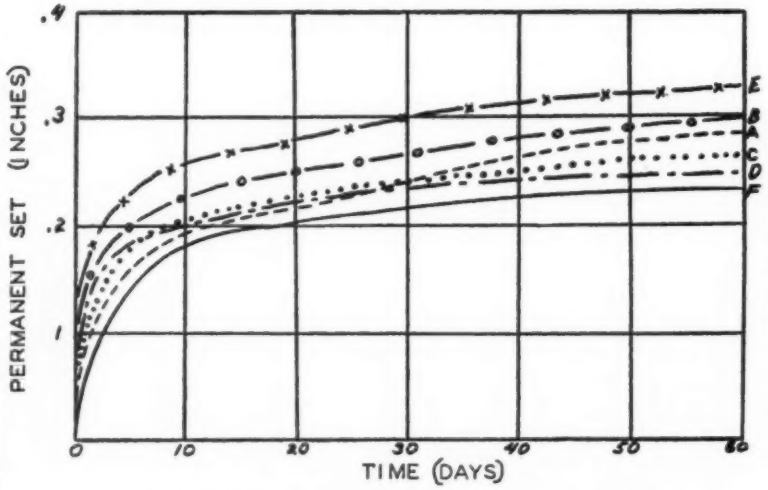
How To Reduce Creep

One problem which still plagues the tool engineer in working with plastics is that of creep. Creep is defined as the change in dimension with time. Our shop has run a number of experiments to determine how this may be overcome, and the accompanying graph illustrates some of our findings. Here are some of the steps we take to hold creep down to a minimum:

First, in designing tools we keep our span-depth ratio below 8 to 1. Thus, for every 8″ of tool length, we provide a 1″ stiffening. Second, we cure the plastic tool or die at the highest temperature and for the longest time feasible, while still in contact with the mold whose shape it is to assume. Third, it is cooled to room temperature slowly and uniformly. Fourth, the tool is built so that it will rest on its own integral supports, spaced to carry the full weight. Fifth, we take every possible precaution to ship and store the tool in its working position.

We have little doubt that the epoxy resins have carved a niche for themselves, especially since they have proved successful for almost all of the applications for which we have tried them. Just how extensively they are being used by Republic is perhaps best illustrated by the fact that our consumption is between two and four tons per month. And it looks to us as if this is only the beginning.

Creep vs Time For An Epoxy-Glass Cloth Laminate Specimens:



Specimens:

Filled Epon resin and six layers of 164 glass cloth, cured with diethylene triamine. Cantilevered beam, measuring 0.125″ x 1″ x 12″, supporting 0.5-lb weight at the free end. Specimens laminated without pressure, and mounted 10 days after laminating. Readings taken at room temperature immediately after removal of load.

Curve A. Control; room temperature (70° F) cure for 48 hrs.
Curve B. Same as control (A) followed by 1 hr at 120° F.
Curve C. Same as control (A) followed by 2 hrs at 120° F.
Curve D. Same as control (A) followed by 3 hrs at 120° F.
Curve E. Same as control (A) followed by 1 hr at 150° F.
Curve F. Same as control (A) followed by 2 hrs at 150° F.

AUTOMATIC ASSEMBLY OF BALL BEARINGS

by Frank J. Sindelar
Chief Engineer
THE BARTH CORPORATION
Cleveland, Ohio

Special machines, employing electronic, pneumatic or hydraulic power components, pioneered today's push-button operations.

MANY AN INDUSTRIAL executive, when scanning his year-end profit statement, gives a heavy vote of thanks to the producers of special automatic machinery designed for maintaining a high level of production and a healthy profit ratio.

As long as forty years ago, The BARTH Corporation (then the Barth Stamping and Machine Works) was pioneering the application of electronic, pneumatic and hydraulic operation as a means of keeping production and profit ratios in tune with rising costs.

In the beginning, many of these applications were designed merely to convert simple but costly manual operation into speedier and more efficient mechanical operations. But, as industry became aware of the potential possibilities of expanding automatic operation over a wider range of production operations, more and more conversions into the realm of automation resulted, until, today, a chain of operations are performed in a single machine and consequently integrated with other machines, thereby expanding automatic operation over ever-increasing production and assembly line functions.

A typical example of such a special automatic machine developed by Barth, is a ball bearing assembling machine built for a conveyor manufacturer.

The problem was that of assembling five components of a ball bearing, consisting of the upper and lower bearing races, a hub, an outer case, and 16 balls, into a completed bearing.

The basic machine used in the development of this job was a punch press, Figure 1,

Fig. 1. The basic machine used for this ball bearing assembling machine was a punch press equipped with five vibrating hoppers and a rotary indexing table. Feed slides grip the parts, as they slide down the inclined track from the hoppers, and drop them in the stations as the table dwells. The sequence of feeding the parts is: (1) outer case; (2) bearing race; (3) hub; (4) 16 balls; and (5) bearing race. The machine is automatic in its operation, the only attention needed is the filling of the hoppers. The rate of production is 45 finished bearings per minute.

Fig. 2. The sketches show the shape of the parts and their position as they are dropped into the table stations. The sequence in which they are fed to the table stations is shown by the numbering of the parts.

equipped with a 20-station rotary indexing table and five vibrating hoppers.

Tracks were provided for feeding the parts from the hoppers to the table stations. Aside from a few fundamentals of track design, each track is an individual design problem. The shape of the part is the first consideration, and then the position in which the part must enter its station is the second consideration. From there on it is a matter of adjustment to attain free movement of the part into its station.

It was determined that the sequence of feeding the parts into their respective stations should be: (1) the outer case; (2) the lower bearing race; (3) the hub; (4) 16 balls; and (5) the upper bearing race.

This sequence and the position in which the parts are fed to their stations are shown in Figure 2. It can be noted that the bearing races are identical in shape, yet their positions upon entering their stations are opposite to each other; that is, one faces up and the other faces down.

The exits from the hoppers are all elevated above the rotary table level, so that the tracks leading to the table level are on an incline. Those parts which are so light in weight that they would not move down the incline by gravity, are helped along by a slight blast of air. Those parts of sufficient weight will slide down without any help. However, on this job all inclined tracks were equipped with air blasts.

As the parts travel down their respective tracks, they move on to feed slides which extend over the rotary table from the ends of the inclined tracks. Each time that the table dwells during its cycle of operation, there is a table station in under each feed slide.

Hopper No. 4 contains the balls and is equipped with a dispenser that automatically drops 16 balls into the bearing as the table indexes into position.

The station feeding mechanisms incorporate a slide that is actuated and controlled by cams driven from the press ram. The slides are constructed so that they grasp each particular part and drop it into a station.

The design of the station cavities provides recesses and a locating pin, so that as each part is dropped into a station, it is automatically located in proper position to receive the next part. The locating pin positions and holds the hub in place while the balls are dropped in place.

Visualizing the operation of the machine from the start of a run, the first part to be fed to the rotary table is an outer case from hopper No. 1. It slides down the track and is dropped into the 1st station by the feed slide at the end of No. 1 track.

Next the table indexes and a bearing race from hopper No. 2 is ready to be injected into the cavity at station No. 2 holding the outer case.

Since the race has to be a press fit in the outer case, it is necessary to force it into the case. This is accomplished by a cam-actuated punch driven from the press ram. After the table again indexes, the hub is fed in from hopper No. 3. The table indexes twice to bring the working station under the ball dispenser, No. 4, to drop 16 balls into the bearing. The last part to be fed in is the bearing race from hopper No. 5.

To secure these parts into a workable ball bearing, the next operation is that of crimping the upper portion of the outer case wall, sketch No. 1, Figure 2, over the upper bearing race. This operation is performed by a punch driven through the press ram. The end of this punch is machined so that the outer case wall is crimped and beaded in one action of the press ram.

The completed bearing is ejected from the next station by an air blast which finishes this cycle.

As this cycle is in progress a succession of cycles are following, so that finished bearings are produced at a rate of 45 per minute.

This automatic assembling machine is typical of many special machines developed by Barth for a wide variety of industries.

Automation through special machines is the key to America's leadership in production and high standards of living.

THREE DESIGNS FOR SPRING-LOADED STOCK GUIDES

by W. M. Halliday
Southport, England

CONVENTIONAL PIERCING DIES, designed to punch thin strip automatically fed from a stock reel, need some kind of guideway in the die to insure accurate alignment of the stock with the punch or punches.

In the interest of low die manufacturing cost, the idea of a simple machined slot across the top surface of the die block or along the underside of the stripper plate, may be of considerable appeal at first thought.

It may well be, however, that this approach to the problem can result in the cheapest being the most expensive, in terms of job performance.

The width of such an inexpensive guide has to correspond closely to the width of the stock being worked to permit smooth feeding and to assure proper spacing of the punched openings across the width of the strip. Further, non-adjustable guides offer no control of the tension imposed on the moving strip.

Because of these limitations fixed guides can only be successfully employed where wide tolerances are permissible in the spacing of pierced holes across the width of the strip, and/or where the slit width of the stock is held to such close limits as to be expensive in procurement. It is also essential that the coiled strip be perfectly clean, free from burrs or ragged edges, and devoid of kinks liable to cause jamming within the solid walls of the guideway.

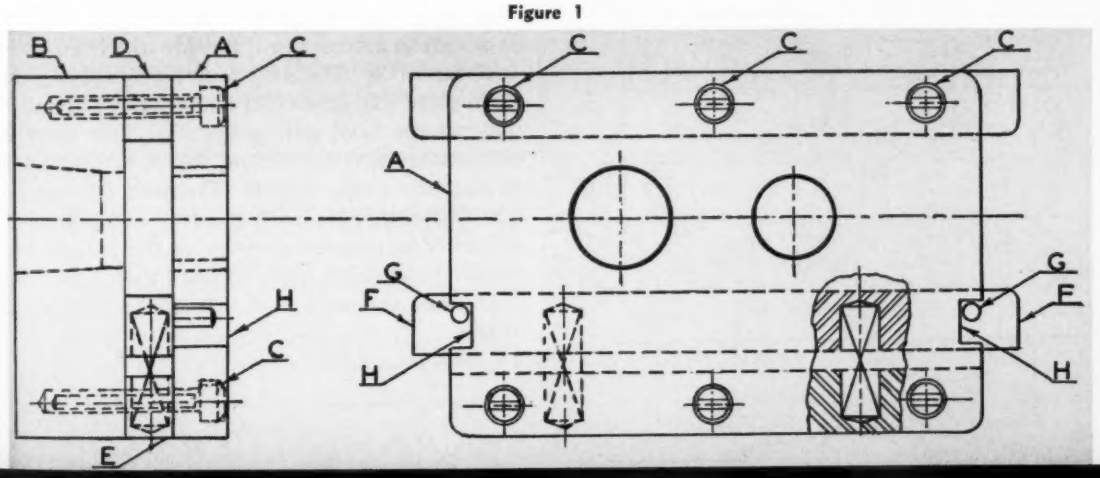
Consequently, fixed stock guides may impose both mechanical and economic handicaps on otherwise successful die performance. The strip may be inaccurately pierced along those narrow portions which fit loosely within the guide. The strip may become tightly jammed between the guide's immovable walls when a slightly wider portion enters therein. This in turn may lead to the longitudinal feed being impeded or completely arrested. Such occurrences are frequent sources of punch damage, cause production delays while clearing the die, and result in workpieces of inferior quality and high scrap loss.

To avoid these and kindred objections, the self-adjusting, spring-loaded type of stock guide is well worth its modest increase in construction cost. Basically, it is a stock guide having one fixed sidewall, with the other member having a small amount of lateral, spring-loaded, sliding movement. Thus it is capable of readily and automatically adjusting itself to slight variations in strip width. Also, the pierced holes are accurately located from the one edge of the strip that bears against the stationary sidewall.

Several other practical advantages stem from the use of an adjustable-width stock guide. The tension brought to bear on the moving strip helps to assure uniform increments of feed. It also prevents, in the case of very thin stock, the accumulation or pile-up of stock in the guide, particularly when the latter is of appreciable length. It results in smoother feed of the strip through the die, thus minimizing interruptions for clearing the guideway. The operation of slender punches is safeguarded to greater extent than possible with a fixed guide, hence longer punch life.

Of the many different constructions by which spring-loaded, adjustable stock guides may be incorporated in a die, the three shown here have features which can be used singly or in combination.

Figure 1



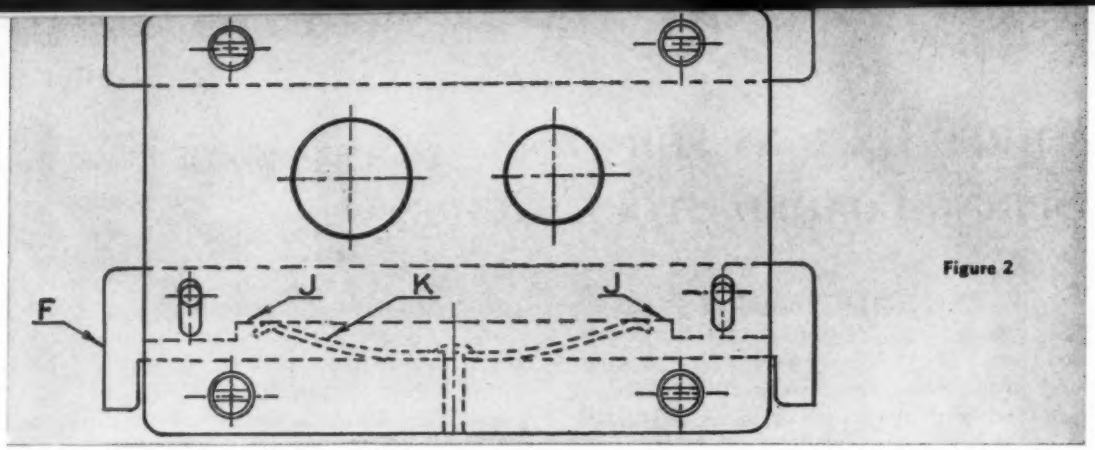


Figure 2

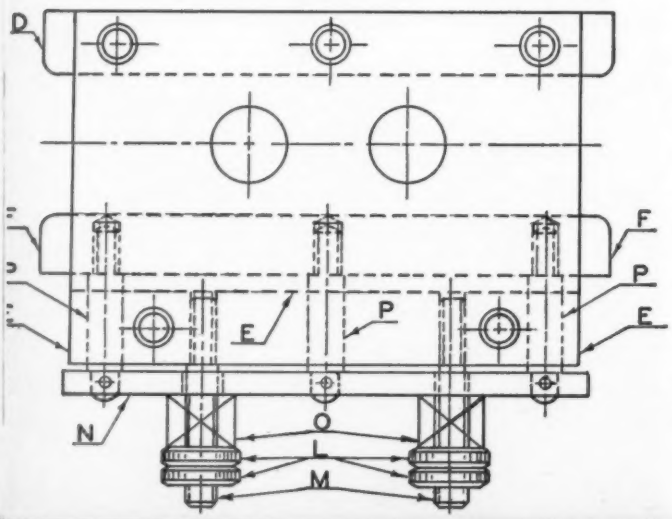
The design shown in Figure 1 is simple, economical and effective for use in piercing or blanking relatively thick stock which varies considerably in width.

The second design, Figure 2, is specially adaptable to small piercing dies performing relatively light duty on very thin, flexible, strip stock which varies but a small amount in width.

There are occasions when the above two types of stock guide suffer from a lack of means for varying the amount of spring tension imposed on the passing strip. Different degrees of tension may be called for because of the flexibility of the strip, the weight of that portion of the strip that is within the confines of the die at any given instant, the manner of feeding the strip through the die, and the fineness of strip width tolerance.

Figure 3 illustrates an unusual yet most effective design of adjustable stock guide which readily permits the degree of spring tension on the work to be varied to meet working conditions. This construction is applicable to most conventional types of piercing and blanking dies. The constructions shown in Figures 1 and 2 can, accordingly, be inexpensively converted to obtain variations in the spring tension on the movable side member of the stock guide.

Figure 3



The constructional components detailed in Figure 1 are readily recognized as conventional. The details of Figures 2 and 3 are sufficiently similar as not to need repeating.

Referring to Figure 2, stripper plate (A) is secured to die block (B) by screws (C) and dowels. Plates (D) and (E) separate the stripper from the die in accordance with the thickness of the strip and the amount of "lift" permitted as the punches ascend.

The spring-actuated guide member (F) is ground enough thinner than (D) and (E) to slide easily within the space it occupies. It is held in an approximately parallel relationship by the pins (G) in the recesses or slots (H). The springs (I) interposed as shown between (E) and (F) urge (F) toward the rear member (D). The amount of movement is governed by the fore to aft dimensions of slots (H). When the springs are fully extended the resultant width of the guideway should be somewhat less than the narrowest work strip to be fed through the die.

The construction shown in Figure 2 is somewhat simpler than that of Figure 1. Here, the movable guide (F) is relieved at (J-J) to accommodate the leaf spring (K).

The variable tension feature disclosed in Figure 3 is attained by adjustment of the round knurled lock-nuts (L). Two long threaded studs (M) are screwed and locked into the front edge of fixed strip (E) and pass through clearance holes in plate (N) at the outside of the die. A stiff coil spring (O) is mounted on each stud (M) to act between the side of (N) and the lock-nuts (L). The action of the springs is to urge plate (N), studs (M) and strip (F) inwards toward the fixed guideways (D). This insures automatic variation of the width of the stock to suit the strip. Guide (F), studs (P) which are locked into both (F) and (N), and plate (N) all move in unison by virtue of the respective, parallel clearance holes in fixed plate (E).

If studs (M) and nuts (L) have a fine pitch thread very sensitive tension adjustments can be made.

How Industrial Suppliers and Design Engineers Work Together

by Walter T. Burwell
Chevrolet Motor Division
GENERAL MOTORS CORPORATION
Detroit, Michigan

THE INDUSTRIAL SUPPLIER is, in a very real sense, the business partner of the manufacturer who uses his product. His counsel is sought by the manufacturer's design engineers since both have the same ultimate goal — to provide a better end product at a lower cost. Perhaps the best way to illustrate this fact is first to describe a typical industrial organization and then to outline the relationship between the manufacturer's design engineers and the industrial suppliers.

For example, in the Chevrolet Motor Division, only a portion of the total engineering design is handled in the Central Office Engineering Department in Detroit. A great number of design modifications results from the work of production engineering staffs located at various Chevrolet plants in scattered locations. These design changes — proposed to permit more efficient use of equipment or to set up some new method of manufacture — often are no less important than the original design work done in the central Engineering Department.

An objective of the automotive design engineer is to establish a design which can be manufactured economically in large volume. This requires the closest cooperation between the Central Office design engineer and the engineers stationed at the Division's many manufacturing and assembly plants. One of the most important duties of the resident engineers — those assigned to the manufacturing plants — is to keep Central Office engineers informed of manufacturing and production problems. Parallel with the duties of the resident engineers in manufacturing plants, those assigned to engineering control in the Division's assembly plants report assembly problems to the Central Office design engineers.

Combined information from these two sources permits design changes to be made to benefit current production and also serve as a guide in establishing new designs for future production.

When a new design is offered for production, the production engineer and the resident engineer at the manufacturing plant concerned are advised of the proposed design. Together they establish dimensional and material specifications as well as the physical characteristics required for the proper functioning of the part. In many cases, this cooperation avoids costly and time-consuming changes after release for production.

By the time the part is actually released for production, the resident engineer is well informed of what is expected of the part and can advise the production department of critical points to be considered in tooling for the job. At this point, the resident engineer works

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It is inconceivable that any one manufacturing organization—no matter how large—could have an engineering staff and facilities extensive enough to cover all the detailed engineering aspects of a complex mechanism, such as an automobile. Consequently, all industrial manufacturers depend, to a considerable degree, upon parts and materials suppliers for engineering information. As a result, interdependence among industries assumes a greater role every day, and, today, the cooperation between the industrial supplier and the manufacturer of the finished product is more important than ever. The manufacturer's design engineer is keenly aware of this situation and is eager to learn of new developments in any field which might improve his product. In turn, the industrial supplier desires to strengthen this relationship between himself and his customer's design engineers. The result—a freer exchange of ideas leading to a better product, more efficiently produced at a lower cost.

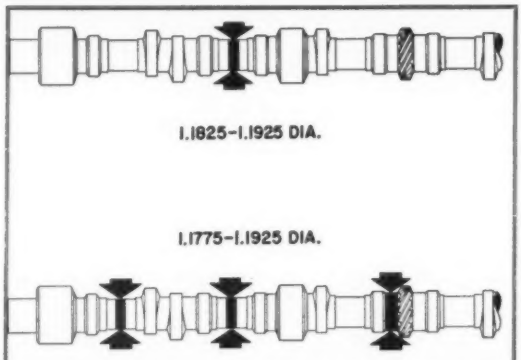


Fig. 1. Often, more than one supplier furnishes the manufacturer with the same product. As it is improbable that any two of these sources have identical processing equipment available, design changes are sometimes made to facilitate manufacture. The two camshafts shown have different specifications for the surfaces (arrows) used only to position the shaft when machining the cam, bearing, and gear surfaces. In each case where such options must be used due to differences in processing equipment, the part is carefully inspected to assure complete interchangeability.

very closely with management at his plant while decisions are made on what types of equipment and which methods of processing will be used.

Often, the production department requests minor changes on the present equipment to aid them in processing the part. These changes are proposed to assure better quality, to permit the use of less expensive tooling, to allow the use of less critical material, to reduce overall cost, or to permit easier handling and shipping.

From this example, it is apparent that there is no sharp division between design engineering and production engineering responsibilities as both work together toward the same objectives. In fact, the production engineer, in many instances, is a design engineer, inasmuch as he can suggest design changes.

This example of the breakdown of engineering responsibilities at Chevrolet Motor is indicative of the setup in almost every large industrial organization, particularly those in which the manufacturing is decentralized.

The Industrial Supplier and Design Modifications

In large volume production, it is not unusual for several outside sources of manufacture to be used, especially for small parts, such as piston rings, oil seals, and gaskets. (General Motors, as a whole, uses over 21,000 suppliers who provide materials and services.) Information on the parts drawings released to suppliers is limited to those specifications desired in the finished piece. The processing details are left to the supplier, in order to permit the maximum amount of latitude in processing.

As it is unlikely that these various sources will have identical equipment available, each source establishes somewhat different methods of processing the part or parts it supplies. Also, it is very probable that one particular design will not lend itself to the most economical manufacture at each and every source. Consequently, optional constructions often are shown on the original drawings made by the design engineers.

It is common practice — when more than one supplier is producing a given part or assembly — for optional constructions to be used, Figure 1. The only requirements are that these parts must be completely interchangeable and must have equivalent performance. There are examples of such optional constructions in Chevrolet Motor Division itself. Specifically, the Flint, Michigan, and Tonawanda, New York, plants produce parts for the same engine but have different manufacturing facilities. Because the processes vary, a camshaft made in Flint may not be identical with one made in Tonawanda — but camshafts from the two cities are fully interchangeable in the engine.

Other examples of optional designs and optional materials are found in such items as bearings, brake linings, and gaskets. Whenever options are used, the part is tested to assure interchangeability, equivalent performance requirements, and durability.

It is impossible for the design engineer who makes the original parts drawing to anticipate fully the manufacturing source's problems; in many cases, he does not even know who the supplier is to be.

To remedy this deficiency, the industrial supplier cooperates with the plant resident engineer in much the same way as the Central Office designer and the resident engineer function together. The supplier analyzes the design submitted to him for manufacture and suggests any changes to the resident engineer which he feels will promote a better product at a lower cost — the mutual aim of both the manufacturer and the industrial supplier. Occasionally, he prepares alternate drawings and submits them to the Central Office designer.

But, before attempting to suggest design changes, the supplier studies the proposed product and its functions. Will his design modification affect the product's interchangeability, lower its performance, weaken its durability, or raise its cost? If the answer is in the negative, the supplier and the original design engineer go over the proposed design modifications together. In most cases, the result is a design change which satisfies the production source without sacrificing any of the original characteristics set up by the design engineer.

. . . Continued on Page 92

TWO DIE DESIGNS: drawing a 2-dia. cup
continuous slotting

by E. H. Ehrich
Chief Tool Engineer (Retired)
Grand Rapids, Michigan

COMBINING THE FUNCTIONS of a triple action die with that of a double action cam or toggle drawing press has made possible the rapid production at low cost of a motor cover having two diameters.

The combination blanking punch and blank holder shown at (3) Figure 1, is held by the punch holder (1), which in turn is attached to the outer slide of the press. The two-diameter drawing mandrel (8) is attached to the inner slide of the press.

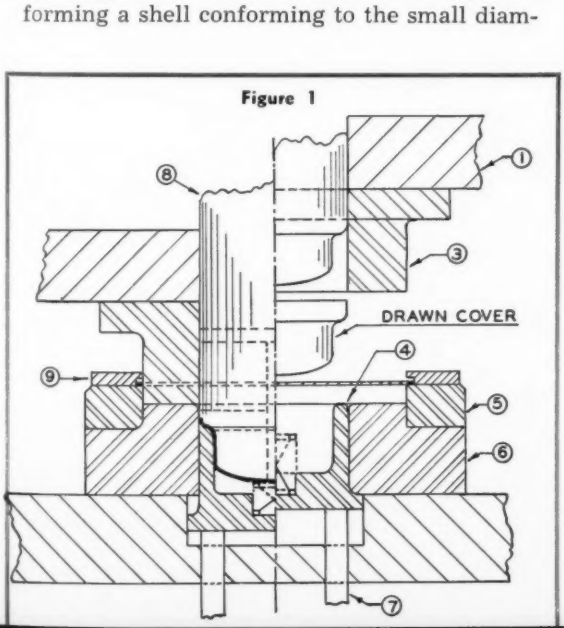
The press is equipped with a coil stock power feed and to the die is attached a scrap cutter.

The sequence of blanking and drawing operations is performed in the following order. As the stock is fed into the stock guides, which also act as strippers, the press is tripped. This starts the descent of the outer slide, carrying the punch holder (1), and the combination blanking punch and upper blank holder (3). As the outer slide continues downward, the blanking punch (3) carries the stock through the blanking die (5), thus producing a round blank of the desired size.

It continues downward until the blank becomes held against the two draw dies, (4) and (6), by the combination blanking punch and blank holder, at the job pressure required.

While the blank is being held, the inner slide, to which is attached the drawing mandrel (8), continues to descend, and the mandrel contacts the blank, draws the blank from between the blank holders, down over the drawing radius of the inner draw die (4), thus forming a shell conforming to the small diameter of the mandrel. The shape of the shell at this stage is shown at (A) Figure 2.

Figure 1



As the inner slide continues its descent, the larger portion of the drawing punch starts the second draw and carries the inner draw die (4) on downward. The inner draw die is supported by either an air or hydraulic cushion set at the pressure required to overcome any tendency to form wrinkles in the finished shell.

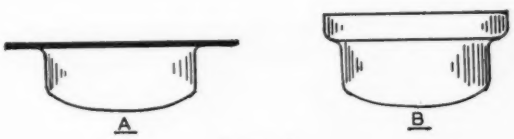


Figure 2

That portion of the blank still being held between the blank holders is thus drawn over the radius of the outer draw die (6) and into the die, producing a shell of two diameters, as shown at (B) Figure 2.

On the return stroke of the press, the outer slide ascends first and is followed by the inner slide; the inner slide traveling at least twice the distance of the outer slide.

The inner slide continues upward after the outer slide has come to rest, and the shell is stripped from the mandrel, as the edge of the shell comes in contact with the face of the upper blank holder, the center opening in which is smaller than the outside diameter of the shell. An air vent is provided in the center of the mandrel to facilitate the stripping.

The shell as stripped from the mandrel can be ejected by a blast of compressed air and dropped into a container or deposited on a conveyor adjacent to the press. The operator may also use a suitable tool to catch the part as it falls from the mandrel and place it in a chute leading to the trimming operation.

Trimming the shell can be accomplished in a number of ways. It can be placed by the press operator into a chute which will feed directly to an automatic trimming lathe such as is made by the V & O Press Company. It can also be trimmed in a Brehm trimming die if production would warrant.

There also is the alternative of pinch trimming the shell at the completion of the draw, but this always presents the problem of removing the shell and scrap from between the tools, and then follows the expense of removing scrap from the shell.

Special Slotting Die

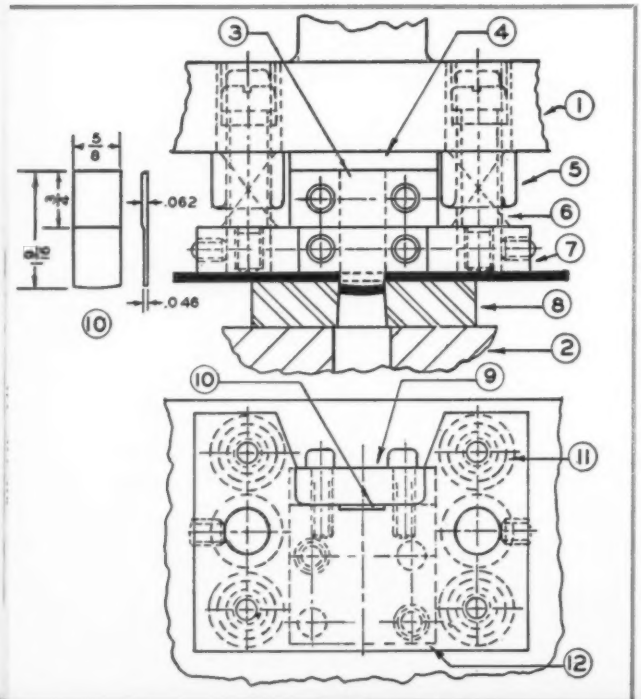
This die, Figure 3, was designed to punch a continuous slot 0.046″ wide in various types and thicknesses of metal. The stock is held firmly against a parallel slide mounted in front of the die. The stock is free to move from left to right in increments of 9/16″, thus producing a continuous slot free from the distortions and burrs often encountered when using a slitting saw for such work.

Due to this special punch and design of die it has successfully punched a continuous slot in hot and cold rolled steel up to 0.107″ thick and in brass 0.125″ thick, or more than twice the thickness of the punch. It is always advisable to use a good lubricant when using a die of this type and the speed of press should be about 50 spm.

This die is not limited to a punch size of 0.046″ x 5/8″ but can be varied to suit any need.

A die of this type can become a very valuable addition to the collection of stock dies generally used in a sheet metal and stamping plant where products are of a short run nature and the cost of conventional dies prohibitive. Anyone familiar with stampings can visualize the many possibilities a die of this design has in cutting out centers of various shapes.

Figure 3



The punch (10) was made from a high speed steel power hack saw blade 14″ long, 1″ wide, and 0.065″ thick. Punches were made from these saw blades due to the fact that we did not have the facilities for heat treating high speed steel, and also because these saw blades are produced in quantities with the precise heat treatment required for uniform hardness and toughness. After the blanks were cut from the saw blade they were ground to size, only requiring the removal of 0.003″ to finish one dimension of punch. A 2″ radius was ground on punch end to protect the corners in punching operation. After punches were ground to size, they were drawn for one hour in an oil bath at 600°F to remove all grinding strains. Finally, the punch was polished lengthwise on both sides of the 0.046″ portion to keep the punch from loading while being withdrawn.

The punch (10) is held securely in the slot of punch plate (12) and is clamped by block (3) and two cap screws. The slot in (12) is 0.003″ less in depth than the 0.062″ thickness of punch shank which makes possible holding the punch securely and without a head. Both details (12) and (3) are hardened and ground.

The punch (10) is guided by a slot in the hardened and ground spring stripper plate (7). This slot is 0.002″ wider and 0.002″ deeper than the punch proper. The front side of this open slot in (7) is closed by block (9) which is secured by two cap screws.

The punch assembly is further supported by two 3/4″ dia. guide pins (6) pressed into (7) and held securely by two set screws. These two guide pins (6) are guided by two bushings (5) pressed into punch holder (1). The spring stripper (7) is secured to punch holder (1) by four stripper studs (11).

For stripping the punch from the stock the four stripper studs (11) are surrounded by suitable compression springs.

The punch has a suitable back-up plate (4), hardened and ground.

You will note that the only unsupported part of punch is the length required to completely punch slug from stock. One unique feature of this punch assembly is that you can remove punch (10) from the die without removing die from press, by simply removing the four cap screws which hold (3) and (9).

The die can be of simple construction and in two parts. Die part (8) can be machined complete, with punch slot ground to width and depth (including proper clearance for slug) in the front face of die. A second piece of hardened and ground steel can be securely screwed to face of die to completely enclose the punch.

How to Handle
PRECISION INSTRUMENT BEARINGS

by A. Allen
Manager Quality Control
and
T. P. Barnard
Laboratory Manager
MINIATURE PRECISION BEARINGS, INC.
Keene, New Hampshire

SENSITIVE PERFORMANCE and accurate operation of modern precision instruments and mechanisms are achieved only through the greatest care in design and manufacture. Each component of the instrument must itself be produced to very exacting quality standards. Equal care must be taken in assembling the precision components so that optimum performance can be realized in the finished instrument. Because of his specialized experience, the components producer can freqeuntly be helpful to the instrument manufacturer in suggesting methods for handling precision parts during inspection and installation to avoid damage and insure effective operation.

Miniature ball bearings, for example, are precision instrument components which, when properly specified, can provide long operation life under severe operating conditions and with little or no attention. However, careless or unskilled handling in either manufacture or assembly can result in irreparable damage or poor performance.

Our experience in the manufacture of miniature ball bearings used in a wide variety of precision mechanisms has shown that dust, dirt, grit and corrosion-producing moisture in the handling area are responsible for more than 60 per cent of problems encountered by instrument manufacturers. The next most common cause of bearing damage is improper handling, either through lack of know-how or simple carelessness. Following are suggestions on handling miniature bearings in the proper environment, and during cleaning, assembly and inspection.

Environmental Control

Since the life and performance of instrument bearings can be seriously affected by the presence of dust, dirt and corrosion, bearings should be handled, inspected or installed only in a relatively dust-free room where temperature and humidity can be closely controlled.

Variations in inspection room temperature can result in erroneous measurements. Superior results with delicate measuring equipment, as well as maximum personal comfort, can be attained if the temperature of the inspection area is maintained at 72°F, plus or minus 4°. Since high humidity may cause corrosion of the bearing surfaces and affect bearing performance, the relative humidity in any area where bearings are handled should be maintained between 25 and 40 per cent.

The dust count in any bearing handling area should not exceed 55,000 particles per cubic

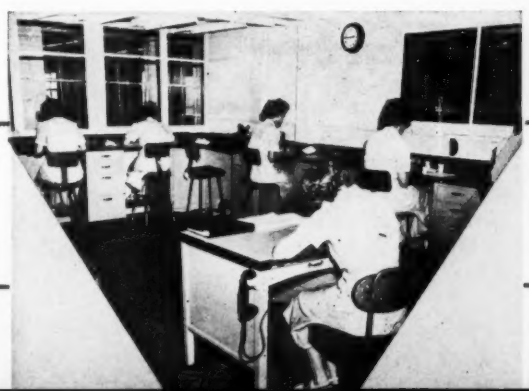


Fig. 1. View of ideal inspection room of MPB plant in Keene, N. H. Obviously, the exceptional cleanliness and orderliness are mandatory for meticulous work of this nature.

Fig. 2. The precision miniature bearings are removed from vials and placed in Petri dishes with tweezers.

foot, with maximum particle size not exceeding 5 microns, as determined by the Greenberg Smith method of collection and standard light field counting technique. Dust control in an area can be achieved by adhering to the following standards of construction, maintenance and use:

1. The room and all furniture should be constructed of material which is easily cleaned.
2. The room should be maintained under a slight, positive air pressure at all times.
3. All air supplied must be filtered. Slow-speed filtering may be accomplished by a precipitron and high-pressure filtering by ceramic elements in the air line.
4. Interlocking air lock doors will insure that the area is never directly exposed to the outside atmosphere.
5. Traffic into and out of the room should be minimized. A tacky gelatin dust mat should be placed in the entrance.
6. Persons in the room should wear lint-free nylon smocks and mesh-bandana headgear.
7. Sweaters, jackets, packages, paper tissues or unclean containers should not be brought into the area.
8. Eating, drinking, smoking or dust producing practices such as erasing should not be permitted.

A regular cleaning schedule is necessary for maintenance of dust control. The following schedule for example, is followed at our Keene, N. H. plant:

1. After each 8-hour shift: clean dust mats.
2. Daily: clean working surfaces, cabinets, test equipment and vacuum floors.
3. Weekly: wash and wax floors, clean air duct vents, precipitron grids, lighting fixtures, bench drawers, etc.
4. Monthly: clean windows, sidewall partitions, glass block sections, etc.

Daily "white-glove" inspection will indicate whether or not cleanliness standards are being adhered to.

Every operation performed on miniature bearings by the user provides an opportunity for bearing damage. Handling during cleaning and inspection must be performed intelligently and carefully. Movement of bearings through uncontrolled areas should be done only in covered containers. Petri dishes are excellent for this purpose. The individual bearings should be handled only with tweezers or finger cots, which must be examined periodically for fraying or flaking. The use of special bearing tools is also recommended where bearings are handled in volume.

Cleaning Bearings

Bearings accidentally contaminated by dirt or corrosion should be cleaned only with a clean high-quality cleaning solvent. Solvents which tend to leave a film or coat on the surface should be avoided and reclaimed solvents must be inspected for cleanliness prior to use. Filtering all solvents before using them will usually insure solvent cleanliness.

Proper cleaning and drying of instrument bearings can only be accomplished with filtered air, although heated air is not essential except when highly volatile cleaning solvents are used. The use of air filters which will pass no particle sizes greater than 5 microns will prevent the introduction of dust during drying.

Excessive air pressure will also damage the bearings. Pressures from 30 to 50 psi, depending on bearing size and retainer type, are recommended. Higher pressures may cause bent retainers which could hang up, kick back or give unsatisfactory bearing performance.

Lubrication after washing is essential to prevent corrosion of the clean bearings. The lu-

Fig. 3. Instrument ball bearings are inspected for OD roundness on an air gage. The inspector uses a special handling tool which contacts the bearing by the ID.

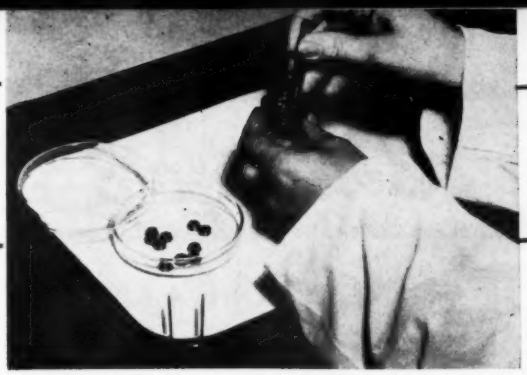


Fig. 5. Miniature ball bearing being installed in plastic housing. Special handling tool is a soft metal tube which contacts the outer ring evenly around its entire circumference to prevent cocking the race as the bearing is positioned.

bricating oil should be filtered prior to use and placed in bearings with a clean hypodermic syringe. After lubrication the bearings should be stored in a dust tight container until ready for use.

Damage During Inspection

Bearing damage may also occur during inpection through the incorrect use of inspecting instruments and gages.

Excessive pressure in the use of both air and contact gage equipment is a common source of bearing damage. Distortion may be caused by OD gaging pressures in excess of 2 ounces, especially when gaging the extremely thin-walled super-light bearings. Plug gages must be of exact bore size (class XX tolerances). Persons using plug gages must understand and practice correct measuring procedures.

An exception to standard plug gaging procedure must be made in measuring the bore of angular contact bearings. The bore of these bearings is formed by a ring of balls. The plug gage is rotated as it is inserted and as it is removed. Attempting to pull the plug from the bore of an angular contact bearing without rotating it can be compared to the Chinese finger trap—the harder it is pulled, the harder it holds.

In measuring the radial play of miniature ball bearings, an 8-ounce major measuring load is recommended in accordance with AFBMA standards. Adherence to this pressure should remove the danger of damage.

Although bearings are demagnetized before shipping, it is possible for them to become magnetized during shipment or after arrival at their destination. Demagnetization prior to inspection or final installation is an added precaution which may be taken to insure optimum bearing performance.

Installation

Final handling of miniature ball bearings occurs during their installation. Only the bearings needed at any one time for a given assembly should be removed from the container. After removal the storage vial should be recapped and stored in an upright position. Bearings should not be placed into the housing of an instrument before finishing operations have been completed. Any machining of the instrument subsequent to installation may cause the bearings to be fouled with metal chips.

Housing and shaft tolerances must be closely held to accommodate the bearings. Housings which are undersized or out-of-round can be particularly damaging to bearing performance. Oversized shafts forced into the bore may expand the bore to such an extent that the radial fit is seriously reduced and the performance of the bearings (particularly with the super-light type which have extremely fragile walls and a minimum radial fit) is impaired.

The use of bearing tools will greatly facilitate mounting. Bearings must be presented to housings or shafts at precise right angle. Bearing tools or clean, soft metal or plastic tubes which will completely contact the inner race face prevent cocking the race or placing excessive mounting loads on the bearing assembly when mounting on a shaft. Similar tools which exert mounting pressures on the outer race should be used when mounting the bearing in a housing. Any heavy pressure or shock used during mounting may easily brinnell the race or seriously damage races, retainers or balls.

Fig. 4. Bearings being demagnetized at MPB prior to shipment.

Chicago 3-Show Preview

THE BEST AND LATEST IN TOOLS FOR PRODUCTION TO BE UNVEILED AT CHICAGO

FASTER AND MORE VERSATILE machine tools, quick-change tooling, and automatic gaging devices are representative of the vast array of up-to-the-minute product developments to be exhibited to Industry at the three big industrial shows scheduled for September 6-17 at Chicago.

Paced by the machine tool builders, whose last show was held in 1947, industrial suppliers from across the nation will present a truly amazing preview of the makings for our truly fabulous factories of tomorrow.

The long awaited "Machine Tool Show," in which members of the National Machine Tool Builders' Association will exhibit, will be the central attraction. With the very fitting slogan, "The world's best investment in action," this show will fill Chicago's huge International Amphitheatre with virtually every type of machine tool engineered for tomorrow's production requirements. The Machine Tool Show will be open from 10 A.M. to 5:30 P.M., each day from September 6-17 inclusive (except Sunday, Sept. 11).

Automatic workhandling devices, higher rates of metal removal, constant cutting speed, greater versatility, self-inspection, feedback systems, tape control, freedom from vibration, more beef and more power . . . all these and many more will be featured on the machine tools now being readied for display at Chicago. For the first time, the country's major press builders will be participating in the Machine Tool Show and their exhibits are certain to reflect the most modern concepts of pressworking.

A complete display of control mechanisms, cutting tools, precision measuring devices, gages, electrical equipment, and metalworking accessories will be offered at the "Production Engineering Show" scheduled for Chicago's Navy Pier on the same dates as the main show. Hours will be from 1:00 P.M. to 10:00 P.M. Organized by Clapp & Poliak, the firm that manages the Machine Tool Show, this show is intended to complement the main attraction in every way.

The third show will be the "Chicago Metalworking Machinery and Equipment Exposition," under the direction of William H. Eisenman. This show will be held at the Chicago Coliseum on the same days as the other two and will be open until 10:30 P.M. each day.

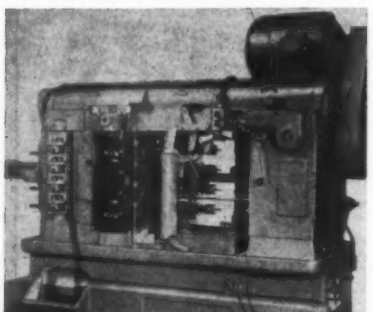
The manufacturing executive who visits Chicago during the two weeks of these three big shows will see more, in less time, of the remarkable advances being made by Industry for Industry than would be possible in any other manner. This will be his opportunity to mentally tool up his plant for tomorrow's competition. It will be his opportunity to measure and compare, to evaluate and order—if he will—the best in manufacturing processes, machines, and equipment.

THE BIG THREE

Sept. 6-17. The Machine Tool Show, at International Amphitheatre, Chicago. Open daily from 10:00 A.M. to 5:30 P.M. (Closed Sunday, Sept. 11).

Sept. 6-17. Production Engineering Show, at Navy Pier, Chicago. Open daily from 1:00 P.M. to 10:00 P.M. (Closed Sunday, Sept. 11).

Sept. 6-17. Metalworking Machinery & Equipment Exposition, at the Coliseum, Chicago. Open daily from 10:00 A.M. to 10:30 P.M. (Closed Sunday, Sept. 11).



The 4-Hi Conomatic, believed to be the only machine of its type, will be spotlighted in Booth 401 at the Machine Tool Show. Exhibited by Cone Automatic Machine Company, Inc., of Windsor, Vt., a 1" model of the 4-Hi will form, chamfer, and cut off studs, four pieces at a time, from 4 bars of 7/8" C1144, held in the four work spindles. A pickoff attachment is featured and holds the pieces for clean cutoff.

Hundreds of Suppliers Participate

For many months, machine tool builders have been working at an ever accelerating pace . . . working to complete their most advanced machines and associated tooling in time to be included in the exhibits at Chicago.

Some of these machine designs are reaching far into the future, bringing into the reality of today the most revolutionary of chip removing and metal-forming concepts. The race for completion before S-day will be close; most will make it, a few may not.

Hundreds of suppliers are in the picture. Their latest bearings and spindles; steels, bronzes, and carbides; indexing, positioning, and holding devices; gears, cams, and drives; hydraulic and electrical controls . . . all will be found in and on the big machine tools and presses being shown at the International Amphitheatre. Many of these suppliers will themselves have elaborate exhibits at the Navy Pier or the Coliseum.

Chicago 3-Show Preview

High Fidelity 3-D Reproduction Provided by New "Velvetrace" Miller with Spark-Gap Tracer

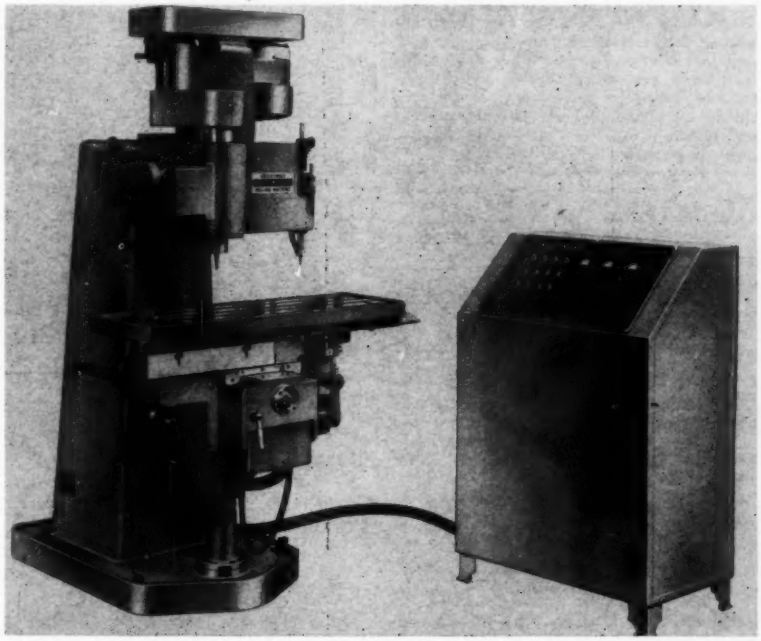
The finest details of virtually any 3-dimensional model can now be reproduced to an accuracy previously not attainable. This has been made possible by development of a new duplicator, the "Velvetrace" Milling Machine, announced by Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Connecticut.

The tracer control system operates on the spark-gap principle, and is relatively simple. The tracer point follows the model with extreme accuracy, but without ever contacting it mechanically. Since there is no contact, there can be no wear or damage to the model . . . no matter how soft or fragile the model may be. There is no deflection or mechanical motion in the tracer and, therefore, no positional offset or time lag. Control signals are produced continuously.

The surface of the model is made electrically conductive and grounded to the machine. A very minute spark-gap of harmless, high voltage, low amperage current between the tracer and the model provides the means of control. The slightest variation in the gap produces a proportional change in the voltage across the gap, which is instantly amplified electronically and used to control the magnetic clutches that drive the spindle quill and the transverse or longitudinal motion of the table.

Each drive has a pair of magnetic directional clutches that are always driving and slipping. Neither ever engages to the extent of not slipping nor disengages to the extent of not driving. The opposed drive provides maximum sensitivity and continuously variable speed control. Each clutch, having its own drive to the slide, eliminates the possibility of backlash.

Operation of the machine is completely automatic. The table is set to travel in a series of passes, step-feeding the cross slide at the end of each pass. If desired, the cross slide can be the traversing member. A very wide range of spindle speeds is available—310 to 10,800 rpm—to accommodate a wide variety of cutters and materials.



Pratt & Whitney will demonstrate the Velvetrace Milling Machine in Space 1219 at the Machine Tool Show.

Heavier Machines Present Problems

Bearing out the advance predictions that the 1955 Machine Tool Show would feature much heavier machines than had ever been assembled under one roof before, it is now expected that some 523 machines will be of a size and shape to require more than ordinarily skilled handling. As a consequence, plans call for the importing, over the weeks ahead, of additional trained machinery riggers.

The absence of overhead cranes, usually present in an industrial plant, has been offset in the International Amphitheatre by the use of locomotive cranes and A frames to handle the heaviest pieces.

Because of the great size of some of the machines to be displayed at the Show it has been necessary in some instances to prepare large concrete-lined pits into which they could be lowered sufficiently to bring their immediate work areas to levels at which passersby could view them readily. In other cases, where such special foundations would involve too extensive preparations, it has been arranged to erect the machines directly on the floor but to surround them with elevated platforms from which spectators can get a "close-up" look at the equipment in operation from any one of several vantage points.

Chicago 3-Show Preview

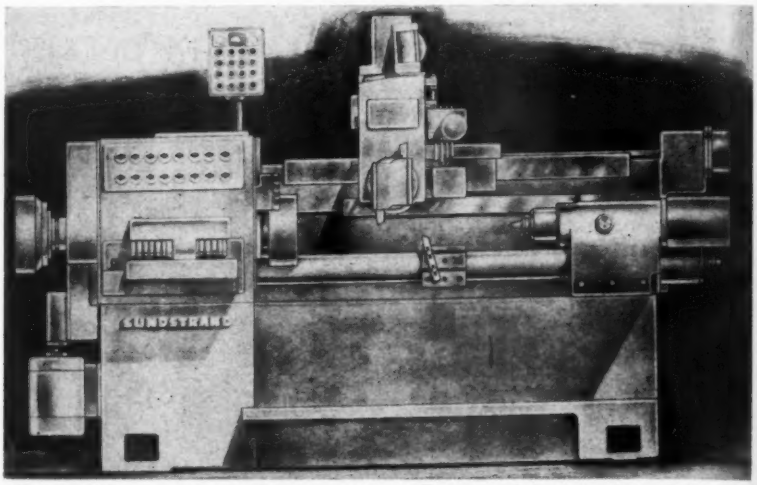
New low-cost master ring gages will be shown in Booth 417, Machine Tool Show, by Size Control Company, 2500 W. Washington Blvd., Chicago 12. Used for gaging and setting indicating bore gages and inside micrometers, these new Master Rings are made within ± .0002" of any specified size, with exact size shown on master to four decimal places, accurate to .0001" in roundness, straightness, and taper . . . non-accumulative.

Machine Control Feedback Unit is to be Shown

A sealed-in control unit for energizing signal lights and relays will be shown at Chicago by The Sheffield Corporation, Dayton 1, O. The "Lectolair" can be used with electrical circuits and relays for feedback control, and to start and stop machine tools. It can provide both maximum and minimum warning lights and maximum and minimum control signals.

This unit with many other measurement and control devices will be shown by Sheffield at Booth 1305, the Machine Tool Show.

Versatile Production Lathe to be Punch-Card Programmed at Show



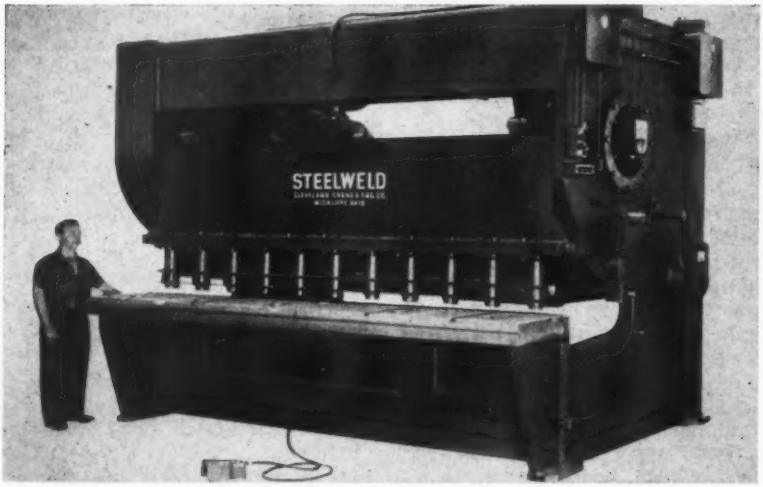
Especially suited to short-run work, the new Sundstrand Model 14 Multi-Cycle, Single Point Production Lathe features ease and speed of setup. The control drum on front of the machine carries easily adjusted dogs for varying shoulder lengths, cycle control, and length of facing tool stroke. Depth of cut is micrometer adjusted for size correction. The open front of the machine facilitates automatic work handling.

Designed for single point turning of shafts, the machine is equipped with a two-position turret so that rough and semi-finish cuts can be taken with one tool and a finish cut with another tool . . . all in one automatic cycle. These three cuts can be taken on each of eight different diameters at eight different speeds . . . all in one automatic cycle. Shoulder facing tools on the front carriage are operated independently and can start cutting at any desired time during the automatic cycle . . . usually during the semi-finish cycle.

The machine has a 40-hp spindle drive motor, ample for carbide tooling. Carriage feeds are infinitely variable from 3½" to 350" per min. Dynamic and electric braking on all slide movements provide accurate positioning.

This new Sundstrand Lathe does not require templates for step turning. However, preset dog plates can be used.

The Model 14 will be demonstrated in Booth 1412 at the Machine Tool Show by Sundstrand Machine Tool Co., Rockford, Ill. The machine exhibited will have a punch-card programming attachment making it possible to change speeds, feeds, carriage, movements, and indexing of the tool turret just by changing the punched card.

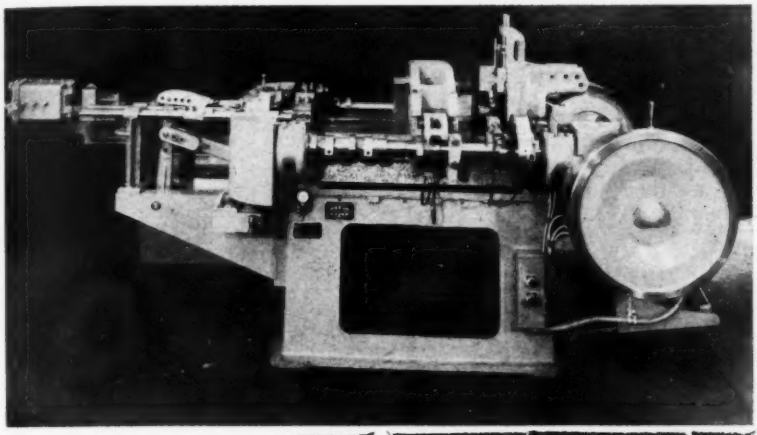


This Steelweld Shear will cut mild steel to 12' x ½", or equivalent. It operates on a pivoted-blade principle without the use of guides and slides common to guillotine-type shears, thus eliminating a principle source of wear and shearing inaccuracies. Knife clearance can be quickly and accurately adjusted to suit the thickness of metal being cut. This shear will be exhibited in the Machine Tool Show, Booth 1418, by the Cleveland Crane & Engineering Co., Wickliffe, O.

Chicago 3-Show Preview

Tapping Combined with Conventional Press Operations in One Setup

The unique versatility of the U. S. Multi-Slide Machines will be demonstrated by U. S. Tool Company, Inc. of Ampere (East Orange), N. J., in Booth 215 at the Machine Tool Show.



A No. 33 U. S. Multi-Slide will be set up to produce a complete formed metal stamping including the piercing, extruding, and tapping of a 6-32 hole. The setup will be shipped, after the show, to the Milwaukee plant of Allen-Bradley Company for continued production of this part.

Coil stock will be fed into the machine and a complete part produced at each stroke. The incorporation of a tapping unit on an already versatile machine is new, and accounts for a substantial saving by eliminating the need for a secondary tapping head.

Fast Tapping of Multiple Holes in One Operation

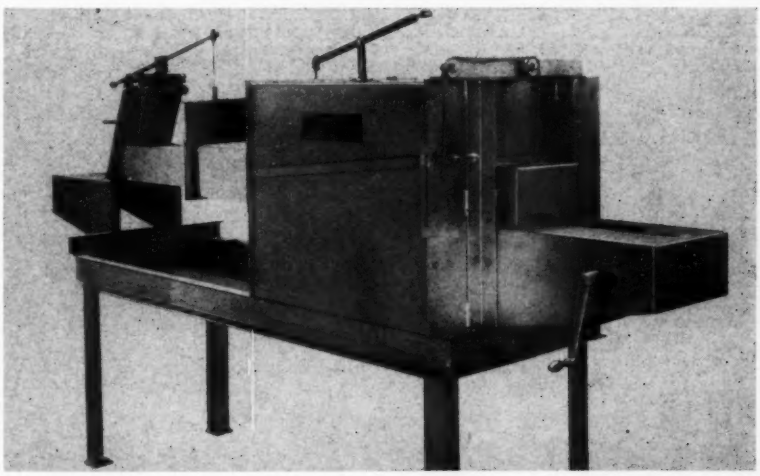
The new "Multi-Tapper" — a complete, self-contained, automatically reversing multiple spindle tapping head for use on any drill press—will be shown by Commander Mfg. Co., Chicago Illinois, in Booth 502 at the (Coliseum) Metalworking Machinery & Equipment Exposition. The Multi-Tapper is universally adjustable to tap from one to eight holes in any pattern.

Commander will also exhibit their new Pneumatic Tapper—an air actuated, high speed, single Tapping head which can be mounted on any drill press. Higher spindle speeds, fast approach, automatic tap reversal (without reversing drill press motor), and quick withdrawal make this unit a truly high production tapping tool.

SHOW BITS

- **One registration ($2.00) will be good for both the "Machine Tool Show" and the "Production Engineering Show."**
- **The American Machine Tool Distributors' Association will operate an information and message center at the "Machine Tool Show". It will be centrally located on the second floor of the Amphitheatre, between the two registration areas.**
- **Parking facilities for 2000 cars will be available next to the Amphitheatre.**
- **Busses marked "Production Engineering Show" or "Machine Tool Show" will operate from the major hotels in Chicago's Loop area.**
- **Both helicopter and bus service will be available between the Amphitheatre and the Navy Pier.**
- **Carboloy Dept., General Electric Co., will maintain, in booth 109, full grinding services for machine tool builders.**
- **In addition to DoAll exhibits at both the "Production Engineering Show" and the "Coliseum Machinery Show", busses will take visitors to see the "Machinorama" at DoAll's new exhibit building in Des Plaines.**

Conveyor Furnace Cuts Cost



A conveyor furnace specifically designed to increase production while cutting operating costs will be shown in Booth 252 at the Production Engineering Show by Hevi Duty Electric Company, Milwaukee 1, Wisconsin. Used for brazing, sintering, and bright annealing, this furnace uses a prepared atmosphere piped into the gas-tight muffle to protect the work from sealing and oxidation. Temperature uniformity is assured because of the furnace construction.

The Sheffield Automatic Welding Machine is designed for welding point contacts of gold, silver, and other precious and semi-precious metals to small contact arms, leaf springs, and other instrument compartments. This point-type welder will be shown in Booth 1305 at the Machine Tool Show, by The Sheffield Corporation, Dayton 1, O.

Grinding Service Offered at Show

Full tool grinding services will be maintained, for machine tool exhibitors, in Booth 109 at the Machine Tool Show. Since a very large percentage of the machines to be exhibited will be actually working on typical production work, this service by Carboloy Department of General Electric Company will help to reduce show-machine downtime and thereby increase the productivity of these machines.

Chicago 3-Show Preview

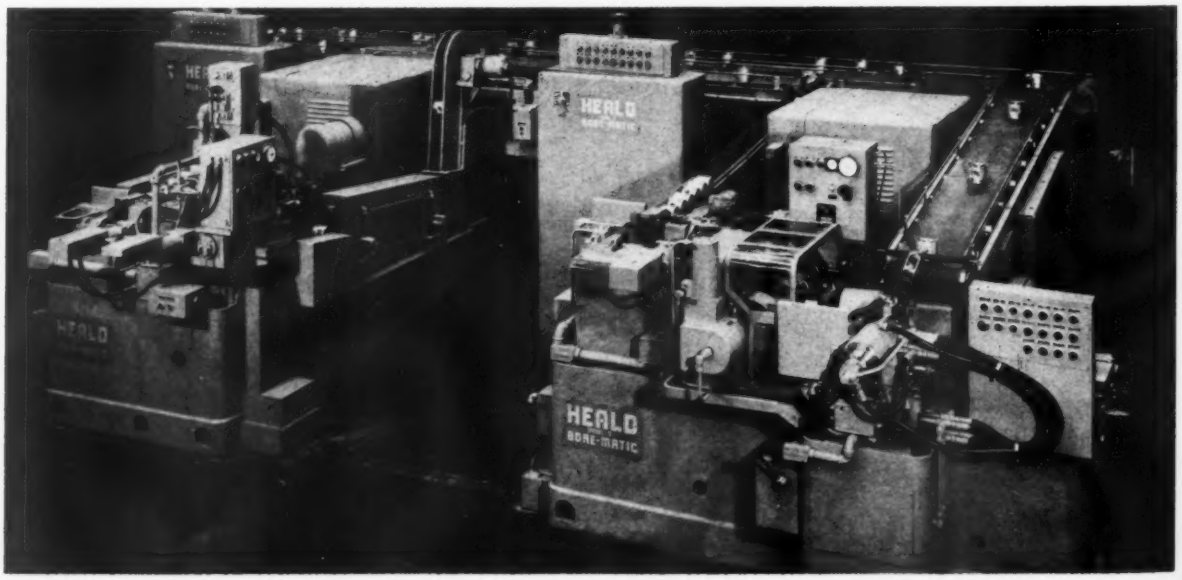
Heald to Show Sample Segment of Fully Automated Production Line

For the purpose of demonstrating the ready adaptability of the new Heald Model "S" Bore-Matics to fully automated, continuous flow production line setups, a sample segment of a complete automated piston line will be shown for the first time at Booth 902 of the Machine Tool Show in Chicago this September. Operations include finish boring and elliptical box turning.

The setup consists of two individual machines placed side by side and connected by a conveyor belt. Work enters loading chute from the conveyor for delivery to first (or pin hole boring) machine, rolls down into an orienting station and is subsequently located and clamped dome down in the work holding fixture. Boring bar enters the work and finish bores wrist pin hole. Work is then unclamped, transferred to an air gaging station after which oversize or undersize work is sorted out of line. Oversize or undersize work flashes an indicator light and stops the machine for correction. (Feedback for tool adjustment is not used in this particular setup because of the fact that aluminum does not present any real tool life problem; however, if a material such as steel were being borized, and the job warranted the additional equipment, tool correction signals could be fed back from this point to the tool.)

From the gaging station, onsize work is rolled down to a flushing station after which it is elevated back to the conveyor. Conveyor moves work to loading chute baffle for delivery to second (or box turning) machine. Here, work is turned on its side and rolls down a loading chute to an orienting station. Work is then transferred to the fixture on a swinging arm type loading plug which locates through wrist pin holes. Work is then clamped in the fixture and the plug withdraws prior to elliptical box turning. Following the turning operation, work is air gaged at which time oversize or undersize readings stop the machine for correction. Work is unclamped, unloaded, elevated, and returned to conveyor.

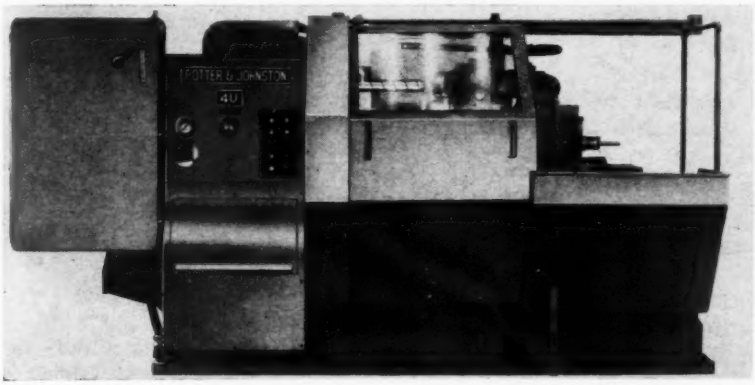
A complete automated piston line, in addition to the aforementioned sample segment, can include stations for semi-finishing wrist pin holes and grooving snap ring grooves, milling out piston domes for valve clearances, saw slotting oil ring grooves, and other operations that may be required.



Chicago 3-Show Preview

Automatic Turret Lathe Built for Carbide Tooling and Fast Cycling

The 4-U Automatic Turret Lathe, recently developed by Potter & Johnston Co., Pawtucket, R. I., handles unusually tough jobs with greater speed and substantial reductions in cost per piece.



The Model 4-U is a rugged machine, designed and built specifically to take full advantage of carbide cutting tools on today's hard-to-machine new alloys. To provide maximum accuracy and resistance to wear, bed ways are of laminated construction with bearing surfaces of hardened tool steel ground in place.

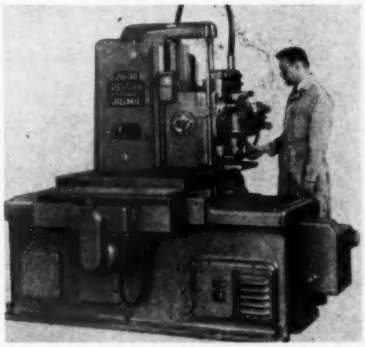
Motors from 15 to 25 hp are specified according to individual requirements. There are six automatic feed changes, and four automatic speed changes from 45 to 1177 rpm.

Turret index, turret fast approach and return, feed start and stop, changes in cutting feeds and speeds, spindle stop, and machine stop can be timed very close and exact to hold the complete machining cycle to an absolute minimum. All functions are controlled by a large, conveniently located control drum.

This Potter & Johnston machine can be seen in operation at Space 1219, Machine Tool Show.

Smaller Jigmil for Jigless Boring

A completely new smaller size Jigmil will be introduced at Chicago by DeVlieg Machine Company, 450 Fair Avenue, Ferndale 20, Mich. The Model 2B-36 Spiramatic Jigmil was designed to meet an increasing demand for a smaller machine for "jigless boring" production parts and the machining of jigs, fixtures, and experimental parts.



The machine will have a 2½" dia. spindle bar, 12" bar feed, 24" x 36" table, 36" horizontal travel, and 24" vertical travel. It will be equipped with all major features of previous models including automatic positioning of both horizontal and vertical slides, power-operated tool lock mechanism, and a new index table for "jigless boring" of repetitive parts.

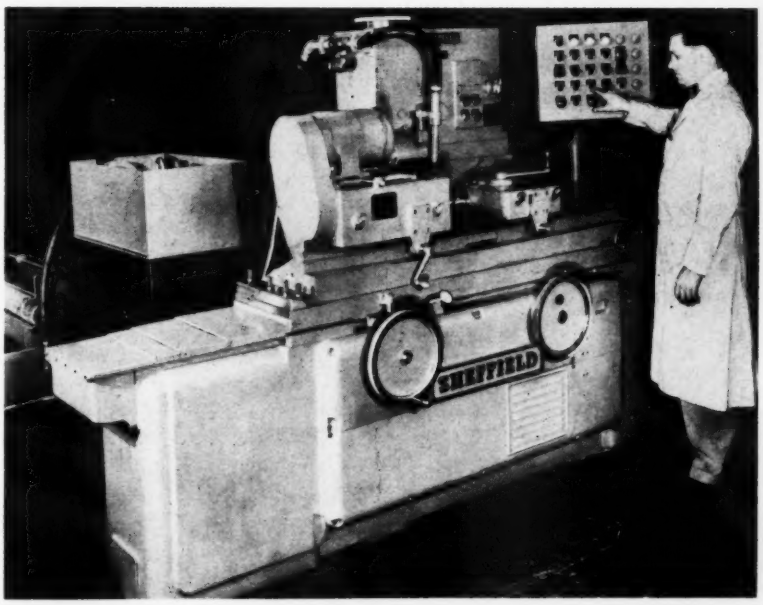
The DeVlieg exhibit will be located at Booth 1317 in the Machine Tool Show.

New Multi-Form Grinder for Large Workpieces

The new Sheffield Model 180 Multi-Form Grinder was designed especially for the Crushtrue dressing process. It uses a 4" wide wheel and will grind work up to 10" in diameter and 24" in length. It is available with built-in controls for automatically bringing parts to finish size.

The Model 180 uses an automatic Crushtrue wheel dressing device, variable speed control for automatic fast and slow feed of the wheel into the work, and automatic plunge wheel device.

This machine will be shown at the Machine Tool Show, Booth 1305, by The Sheffield Corporation, Dayton 1, O.



Suppliers, from page 80

Design analysis and processing studies on the part of the supplier continue even after the part is in actual production, since experience gained in producing the item may dictate the advisability of minor design revisions either to improve the product still more or lower the cost without reducing the quality.

The Supplier Offers His Own Product

Sometimes, a particular supplier develops a product of his own design which he feels the manufacturer may be able to use. He has already familiarized himself with the manufacturer's end product or products and he may visualize one or more possible applications for his new product. He submits his new design to chemical and physical tests and compiles all the pertinent data. He smooths out as many of the rough spots in his design as he can.

His next step is to contact the manufacturer's design engineer. These contacts are on an engineering basis rather than a sales basis. (As a rule, the contact is made by the supplier's sales engineer and sales representative together. This way, engineering information can be exchanged readily and a minimum of time is consumed. Recently, the trend has been toward technically trained sales representatives or at least salesmen with a working knowledge of engineering fundamentals.)

The sales engineer (or sales representative) comes to the meeting prepared with data on his new products:

- Design criteria
- Physical characteristics, such as resistance to corrosion, resistance to oil and gasoline, and effect of high and low temperature operation
- Processing limitations
- Handling problems
- Typical applications
- Servicing procedure
- Patent restrictions

(While all of these data may not be applicable to some products, the supplier's information is as complete as possible in every case. The reason is that, even if the supplier suggests a particular application for his product, the disclosure of these data may prompt the design engineer to consider the new product for another application he has in mind — one that the supplier did not recognize.)

One effective method of presenting data that is sometimes used by the supplier is a chart showing both the advantages and the disadvantages of a proposed product. Table I is an example of one of these charts. (The terms in this table are of a general nature for illustrative purposes; in an actual presentation the features are as specific as possible.)

COMPARISON OF FEATURES OF PROPOSED NEW PRODUCT

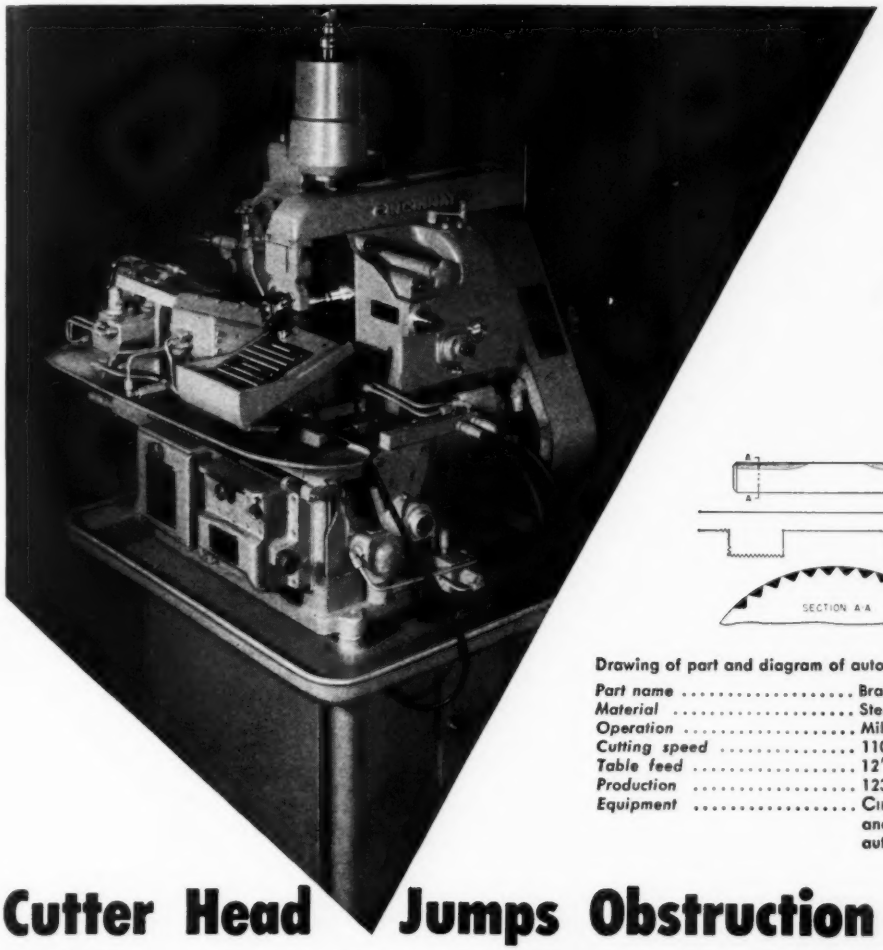
Advantages
Improved Durability
Lower Handling Costs
Less Scrap Loss
Lower Maintenance Cost
Lower Cost
More Uniform Quality
Disadvantages
Slight Weight Increases
Limited Function at —40°F
Requires Modification of an Adjacent Part

Table 1. One of the methods sometimes utilized by the industrial suppliers' sales engineer for presenting the strong and weak points of his new product is illustrated in this table. The industrial supplier endeavors to turn over to the manufacturer's design engineer a product as completely developed as possible—requiring, on the part of the manufacturer, only tests to verify data on the product's performance as listed in a chart of this type. (The terms of this chart are of a general nature for illustrative purposes; in actual presentation, the features are as specific as possible.)

The alert supplier keeps in mind that the design engineer is trained to deal with facts and to face realities, but that he is always aggressive and seeking new and different ways to do things. Because of this, the design engineer is curious and somewhat skeptical — or at least to others he sometimes seems skeptical. He must assemble data in an unbiased manner and study them before arriving at a conclusion. All of these characteristics are summed up in what is called "a scientific attitude of mind." Consequently, the supplier knows that the most effective method for gaining the design engineer's confidence is to submit factual data regarding his new product and its performance. So, the supplier is quick to label a fact as a fact and to have factual data on hand to back up an opinion. In addition, the supplier does not hesitate to disclose the limitations of his product for any given application — in advance of any tests run by the design engineer. This procedure avoids delays and expense that occur later when the limitations are discovered by the manufacturer and the honesty of such a presentation leaves a much more favorable impression with the design engineer.

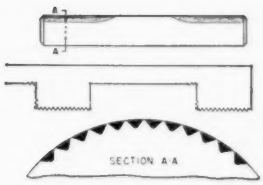
Summary

The industrial supplier and the manufacturer work together in the same sense as business partners cooperate. The industrial supplier is encouraged to offer practicable design changes and to submit new products. The manufacturer's design engineers are kept up-to-date on engineering information and the supplier's processing problems. And this cooperation, in turn, results in a more efficient finished product at a lower cost.



CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine with automatic fixtures for milling the serrations in both ends of brake pedal shafts, at a production rate of 123 per hour.

MACHINE TOOL SHOW
INTERNATIONAL AMPHITHEATRE
CHICAGO, ILL.
SEPT. 6-17, 1955
BOOTH 1205



Drawing of part and diagram of automatic cycle

Part name	Brake pedal shaft
Material	Steel
Operation	Mill serrations, both ends
Cutting speed	110 ft. per minute
Table feed	12" per minute
Production	123 per hour
Equipment	CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine, with automatic fixtures

Cutter Head Jumps Obstruction... Milling Two Sets of Serrations in One Cycle

Costs descend vertically and operators are happy with the automatic equipment illustrated here. It's a CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine, with a magazine type fixture. All the operator has to do is stack work on a shelf; the machine and fixture take over the job of loading, clamping, milling and ejecting. ¶In one operation, serrations on both ends of brake pedal shafts are automatically milled with this setup. The machine's hydraulic rise and fall feature is the deciding factor in taking these two milling cuts. After taking the first cut the spindle carrier automatically rises, the table repositions, and then the carrier advances down to accurate depth for the second cut. Production averages 123 shafts per hour. ¶CINCINNATI No. 0-8 Automatics have many features of value for this type of work, and our Application Engineers have the know-how to tool them up to your requirements. Would you like to know more about CINCINNATI No. 0-8 Automatics? Ask for catalog No. M-1607-2.

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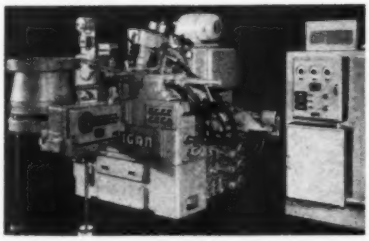
CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine. Catalog No. M-1607-2 contains complete specifications.

CIRCLE INFORM-A-GRAM KEY NO. 931

Automatic Gear Production Line A Highlight of Machine Tool Show

"Gear-O-Mation", the application of automation principles to the production of gears and splines, will be featured in the exhibit of the Michigan Tool Company, 7171 E. McNichols Rd., Detroit 12, at the forthcoming Machine Tool Show. The center of attraction will be an automatic gear production line—from blank to finished gear.

Blanks will be fed to a Model 1445 universal Ultra-Speed hobber equipped with automatic loading. After the blank is hobbed, the gear goes through a Michigan gear washer to remove any clinging chips, then through a 3-Way gear classifier that passes the correct size gears through and rejects the occasional oversize or undersize gears through separate chutes. In the event that gears check undersize or oversize, a feedback system activates an automatic center distance regulator, integral with the hobber, and makes the required adjustment to bring the hobbed gears within the specified tolerances.

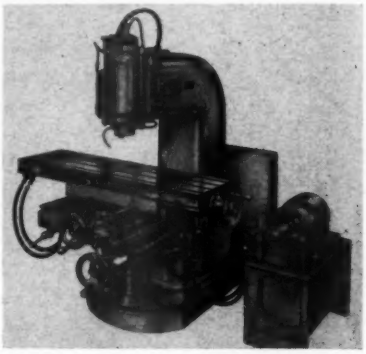


A conveyor carries the correct-size gears to the hopper that feeds the Model 870 "underpass" gear finisher. After the gears are shaved, they pass through a second washer and a 3-Way classifier that is also equipped for size control of the shaving machine.

This line and other gear forming machines to which "Gear-O-Mation" principles have been applied will be shown by Michigan Tool Company in Booth 1220 at the Machine Tool Show.

New Fluid Feed Vertical Miller

Being shown to the public for the first time, the Onsrud A245 Fluid Feed Milling Machine will be the center of attraction in the Machine Tool Show Booth No. 812, occupied by Onsrud Machine Works, Inc., 7720 North Lehigh Avenue, Niles, Ill.



This medium sized vertical miller features power table feed in all directions, manual control instantly without stopping the hydraulic system, and a two-speed, 7.5/17-hp, liquid-cooled, induction cutting head.

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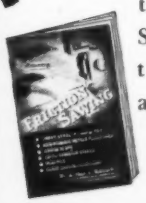

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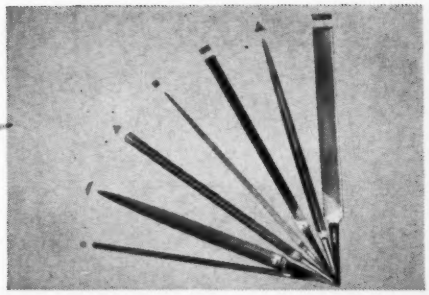

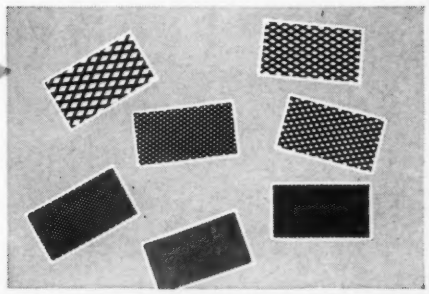

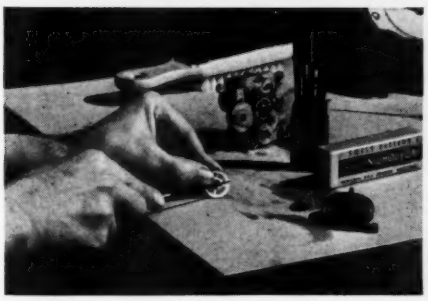

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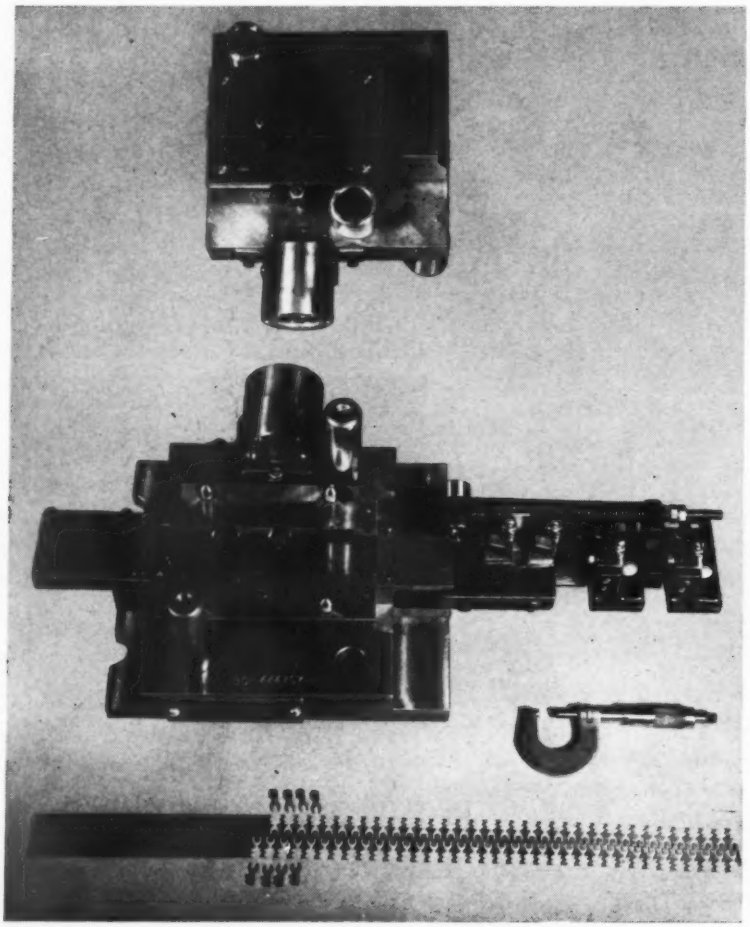

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"Commendable Comments"

"The great difference in the productiveness of the Chinese coolie and the American workingman is the fact that the American has behind him all the nation's technology, training and the most modern tools and facilities."

—From an address by Harold Brayman, Director of the Public Relations Department, Du Pont Company, at the annual West Virginia Industrial Development Conference.

"The next few years will see even greater advances in the field of automatic loading and unloading, making possible complete automation in the plating and furnishing departments."

—A. B. Hoefer, Vice President, Frederic B. Stevens, Inc.

"Tiresome and monotonous operations must be minimized through mechanization and automatic production. Substitution of brainpower for manpower should be the rule."

—From an address by B. D. Smith, General Supervisor of Mechanical Engineering, Engineering Research, International Harvestsr Company.

"The best antidote for fear is the kind of courage gathered from an awareness of what the American way of life really means and has meant throughout our history."

—F. Stillman Elfred, Executive Vice President, Olin Mathieson Chemical Corp.

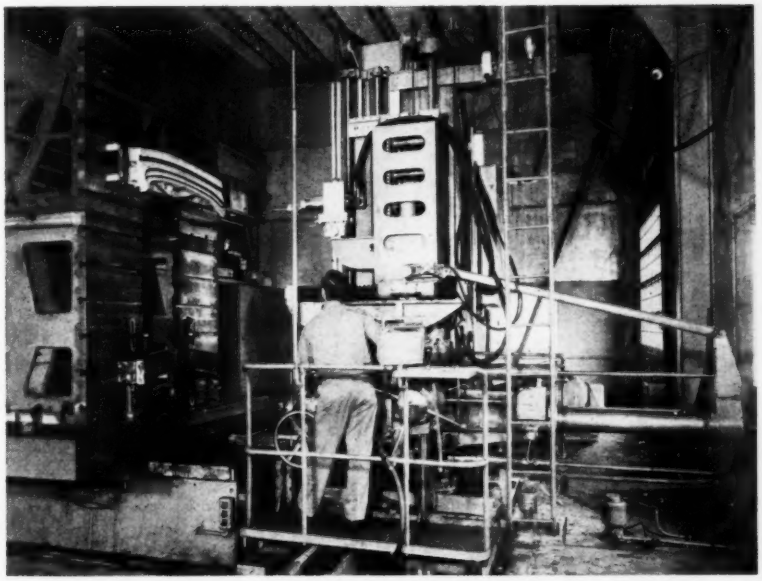
The engineer "must come out of his cell, which is too often walled by complete absorption in his work, and take interest and activity in civic and political affairs. Human behavior, economics, philosophy, social and political science should make a man a better engineer and most certainly a better citizen."

—John C. Sharp, President Hotpoint Company.

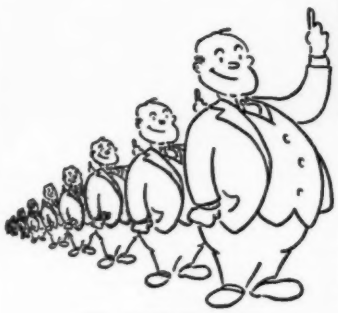
"In the simplest terms, the emphasis in our fundamental research activity . . . is placed on securing knowledge that does not now exist — knowledge about nature itself . . . In . . . basic research . . . we know what we want before we start; we are working to satisfy a known need for improvement . . ." Applied research is tied in with engineering development.

—Dr. Daniel Alpert, Westinghouse Research Laboratories.

Tracer Controlled Machining Applied to Horizontal "Boring Mills"



Ohio Boring Mill Floor Type Machine With Walker Hydraulic Duplicator.



MR. DUPLICATOR

MR. DUPLICATOR SAYS — "Walker, in my travels through the automotive industry I note with amazement the huge machines used in making the various body dies. I believe this should be quite a field for your Duplicators."

WALKER SAYS — "Mr. Duplicator, you are right. There are huge special machines used to machine the uneven surfaces found in top dies, side panels, and fender and hood dies. The Hydraulic Duplicator plays a very important part in the machining of these dies, due to the fact that the Walker Hydraulic Duplicator is an attachment that goes on a standard boring mill of any make in these shops, giving a 2-purpose machine duplicating from a soft model make of wood or plaster."

The Duplicator is so arranged that in a few minutes time it can be disengaged and brought back clear and free without any interference with the boring mill when it is doing its standard work.

A noteworthy feature in the Walker Hydraulic Duplicator is that on these large mills tracer control valve can be brought down so that even in the duplicating of a small part the setup is easily accomplished. A hydraulic cylinder is arranged to raise or lower the tracer in its desired location. Micrometer adjustments of a 6 way design enables accurate positioning of the tracer tip. Formerly raising and lowering the tracer to a rough position was tediously done by a rack or screw movement. The hydraulic cylinder is definitely arranged for the operator's convenience, along with the feed and reverse valve which are prominently shown. This is new. No one else has it but Walker.

Tracer standard is of the latest design moving back and forth on ball bearings. There is definitely no lag, response from the tracer is instantaneous. Hydraulic cylinders straddle the bar, a yoke connector and quill extension of sturdy design and carefully engineered takes as heavy a cut as the cutter will stand. When not in use the yoke connector is disengaged and is supported by a bracket carefully fit for proper realignment when reengagement is needed. The weight that is added to the head is taken care of by an auxiliary counter balance. The head will raise and lower just as freely with the addition of the Walker Hydraulic Duplicator as it did before. In this installation the hydraulic power unit rides along on the column and the ladder has an extension so there is no interference with the push rod.

This is just one example in the building of this type duplicator. Our Duplicators can be built for any boring mill large or small and for 2 or 3 dimensional control when the customer requires it. Most jobs of this type can be done with an in and out movement of the bar. Practically any milling machine that is in a customer's shop can be equipped with a Walker Hydraulic Duplicator to duplicate from a soft model made of wood or plaster.

Duplicators are also made for lathes, planers, shapers, grinders, and special machines. They can come as standard equipment if you ask for them on your new machines. Our Duplicators are in use all over the country and we have representatives in all principal industrial areas. We would like to help you! Write or call us today! Phone 7871.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL AREAS

Walker HYDRAULIC DUPLICATOR CO.

P. O. Box 471 STANDISH, MICHIGAN

Pioneer Designers and Builders of Precision Duplicating Equipment

CIRCLE INFORM-A-GRAM KEY NO. 971

NEW!

MAXWELL BORING and REAMING CUTTERS with *FULLY PROTECTED** ADJUSTMENT

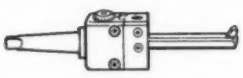
- **FULLY PROTECTED** — Micrometer adjusting screw, fully protected against wear and gall from chips for improved cutter performance and increased tool life, permits positive adjustment in both directions to increase or decrease cutter diameter.
- **QUICK SHARPENING** — Maxwell cutters are simply sharpened and set to size, eliminating time-consuming size grinding.
- **LOWER INVENTORY** — Only 16 cutters required for bores between 1" and 2" in diameter. Cutters available singly and in sets.
- **SELECTIVE FLOAT CONTROL** — Built into all Maxwell Boring and Reaming Bars.

*Patent Pending

SEND FOR MAXWELL BORING & REAMING TOOL CATALOGUE NOW.

THE MAXWELL COMPANY BEDFORD, OHIO

SEND FOR MAXWELL TOOL CATALOGUES



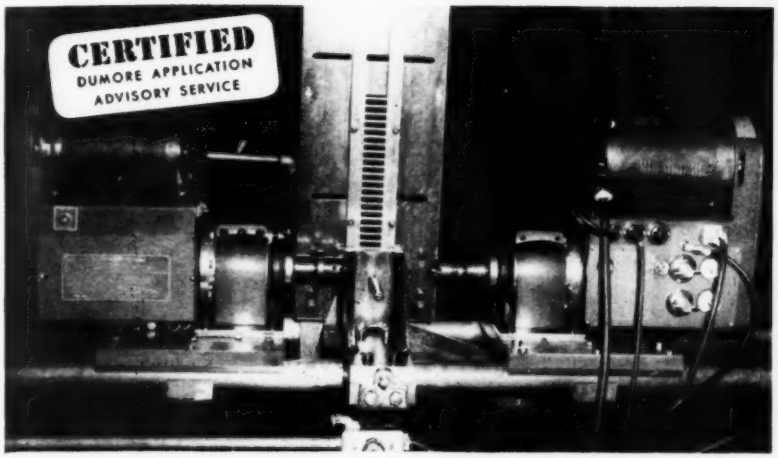
PRECISION BORING HEADS

AUTOMATIC RECESSING TOOLS

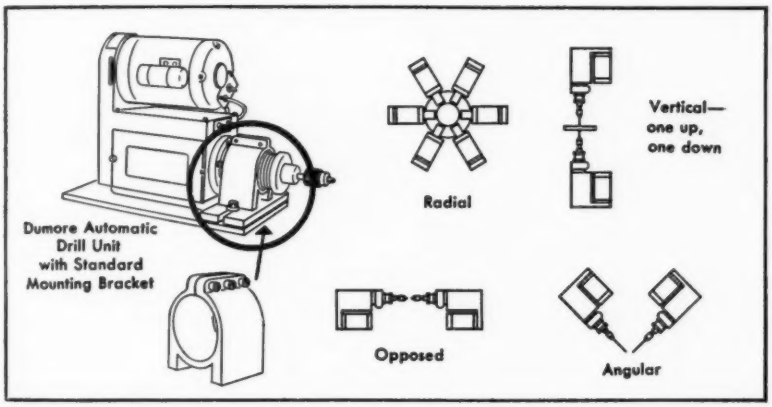
HUTTO ADJUSTABLE BOREGAGES

CIRCLE INFORM-A-GRAM KEY NO. 981

Facing-Deburring Job Speeded Up 300% with Versatile DUMORE Automatic Drill Units



This "Special" Machine, constructed from standard parts, faces and deburrs four times as many steel pipe sections as the previous method. As each part falls from the hopper to the fixture, an automatic switch actuates a clamping device to hold the part. The two Dumore Automatic Drill Units, also actuated, advance, face and deburr the ends simultaneously, and retract to starting position—all automatically.



Key to Simplicity of the Dumore Automatic Drill Unit is the standard mounting bracket which permits quick removal and transfer of Dumore Units to other shop operations. These low cost brackets quickly adapt Dumore units...at any angle...to existing shop equipment. Dumores are delivered complete and ready to be used. All controls, electrical and pneumatic are built in.

VISIT THE DUMORE BOOTH, 547, PRODUCTION ENGINEERING SHOW, NAVY PIER, CHICAGO, SEPT. 6-16.

Star Tubular Products Co. of Chicago wanted to step-up production of their welded steel pipe sections. A major stumbling block was the slow job of facing and deburring both ends of each section. The process required handling each part three times: facing and deburring one end, removing and reversing the part, facing and deburring the other end. Output was 135 pipe nipples per hour. Dumore was asked to find a better, faster method.

Technical Application Aid

Dumore's Application Advisory Service recommended a set-up that resulted in the machine pictured at the left: two Automatic Drill Units opposing each other with a hopper feed for the pipe sections in the center. As each pipe section falls into the fixture, it actuates the Automatic Drill Units which move in and face and deburr each end simultaneously, retract to starting position, actuate work feed and advance again—all automatically.

Production Goes Up

The set-up, as simple and inexpensive as it was, boosted production to 500 parts per hour—a 300% increase. In addition, the accuracy of this finishing process permitted the company to roll-cut their tubing, instead of square cutting, reducing the cut-off operation time by 300%!

The "multiple-use" value of Dumore Automatic Drill Units is still another benefit the customer gets. Its unique, simple mounting feature permits it to be quickly transferred and re-used for drilling, tapping, reaming and related operations throughout the shop, paying for itself over and over again.

Let Dumore's Application Advisory Service help you get increased production and lower costs on jobs like this. Write for FREE Dumore Application Analysis Kit.

DUMORE®

AUTOMATIC DRILL UNITS

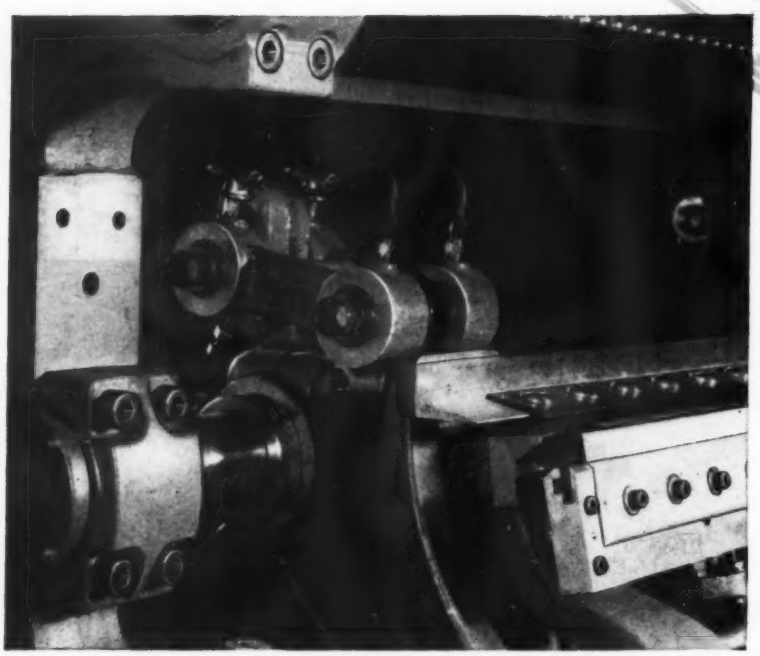
TOOL POST AND HAND GRINDERS

1304 Seventeenth St., Racine, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 991

P-K "proving ground" for

ASSEMBLY STRENGTH



STAY TIGHT UNDER TOUGHEST CONDITIONS

In the warp knitting machine, above, P-K Socket Screws stay tight under constant vibration. Some of many different P-K Socket Screws used are shown — P-K Cap Screws in shaft bearing pads and needle bar clamps, and P-K Set Screw in collar on needle bar rocker shaft.

The "proving ground" for the holding power of P-K Socket Screws is industry-wide. Millions of assemblies made by thousands of satisfied customers are your assurance that screws made to P-K quality standards meet every test.

In many of these assemblies, P-K Socket Screws are subjected to extreme conditions of shock and vibration . . . such as ordnance and other products made to exacting demands of the Armed Forces.

Get samples, information from your P-K Distributor, or write:
Parker Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

PARKER-KALON®

SOCKET SCREWS

Remember **P-K** means **OK**

CIRCLE INFORM-A-GRAM KEY NO. 1001

if your production calls for PRECISION TOOLING...

you need this BROCHURE

Our scope of activities, as outlined on the various pages of this brochure are important to you — they provide ideas on the new concept of tooling — the phases of which no manufacturer can ignore, the stability of an organization whose skill and ability are vastly aiding industry to greater precision and production than ever before possible. It costs no more to work with the Leaders of the Industry — put Cleveland Tool and Die on your suppliers list — now.

CLEVELAND TOOL AND DIE COMPANY

1643 EDDY ROAD • CLEVELAND 12, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1011

Month's Talk, from page 48

"The aids — internal departmental inspection and such functions which help you do your work — continue to be under your jurisdiction.

"You already know how well this changed concept of foremanship has worked out from your point of view. From mine, I can tell you that selling is much easier and our security is greater because of materially reduced costs. Management now knows what kind of training you want to become even better managers. We have an *esprit de corps* which is the envy of our neighbors and competitors. The channel is wide open for transmitting our thinking to you and your thinking to us. This change has certainly been for the better. In Navy terms, 'Well done'."

From these actual remarks, it can be concluded that all in the supervisory force become exceedingly management minded when their basic wants are supplied. I have dwelt at length on our cost control plan because it, more than any other single management tool, supplies most of those wants.

—— • ——

Snyder Expands Machine Tool Plant

An expansion program designed to create one of the country's most modern plants for the production of automation machines and special machine tools has been revealed by Howard N. Maynard, president of Snyder Tool & Engineering Co. of Detroit.

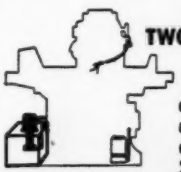
The half-million dollar program will provide a 50% increase in floor space and will be completed by early fall of this year.

Maynard predicted that transfer type machine tools in the next few years will reach up to 250' in length. They will embody such concepts as decentralized machine controls, automatic in-process gaging devices, and cybernetic control systems. As a result of this increasing complexity, it has become imperative for the machine builder to set up the machine in his own plant and fully try it out before shipping. The expanded Snyder facilities will enable the company to do so.

put a GRAYMILLS Coolant System

on that machine for LONGER LIFE... BETTER FINISH... FASTER CUTTING

Standard Packaged Units are available from your nearby INDUSTRIAL DISTRIBUTOR

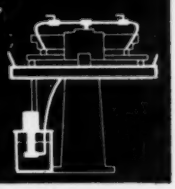


ONE MACHINE... TWO COOLANT PUMPS

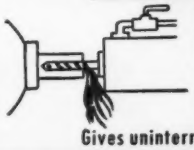
Don't drain sump when you need a different coolant. Merely divert flow to a Graymills auxiliary system. $90.00

GIVE THIS TOOL GRINDER A COOLANT SYSTEM FOR $79.50

Abundant flow for better finish and life on carbide cutting tools.



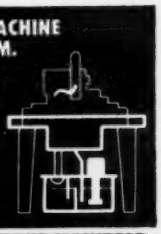
FASTER DEEP HOLE DRILLING

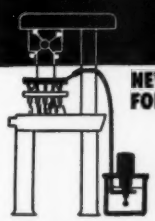


with oil-hole drill and GRAYMILLS Pressure Type Coolant System. Auxilliary system flushes chips through holes in tips of drills. Gives uninterrupted feed. $137.50

ABRASIVE CUT-OFF MACHINE GETS COOLANT SYSTEM.

Wheels cut faster—last longer. Delta Machine system complete $112.50. Pump system only $68.00

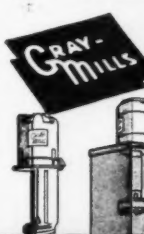




NEW COOLANT MANIFOLD FOR MULTIPLE DRILLS...

Off and on control. Coolant flows as drilling starts. Nozzles need no adjustment. Complete with off-and-on valve..$62.00

SEND FOR "IDEA" BOOKLET that shows how GRAYMILLS Coolant Systems are used effectively on many other machines not shown here.



GRAYMILLS CORPORATION

3713 N. LINCOLN AVE. • CHICAGO 13, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1012

CONTINUOUS METAL REMOVAL BY NON-STOP BROACH

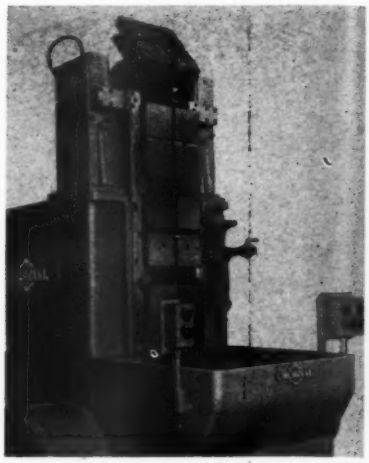
A revolutionary broaching machine employing a completely different approach to surface broaching will be shown in Booth 1112 at the Machine Tool Show by Colonial Broach & Machine Company, P. O. Box 37, Harper Sta., Detroit 13. The new Colonial "One-Way" achieves virtually continuous metal removal by mounting a series of broach carriers on an endless chain.

Broach carriers move downward on the front of the machine, entering precision ways before contacting the work to insure accuracy. The part being broached remains stationary in suitable holding fixtures on the work platen. After entering the ways, the broach carriers become individual rams. The chain applies only down-pull on the ram; gibs and ways support the ram while broach teeth are cutting, as with conventional surface broaching.

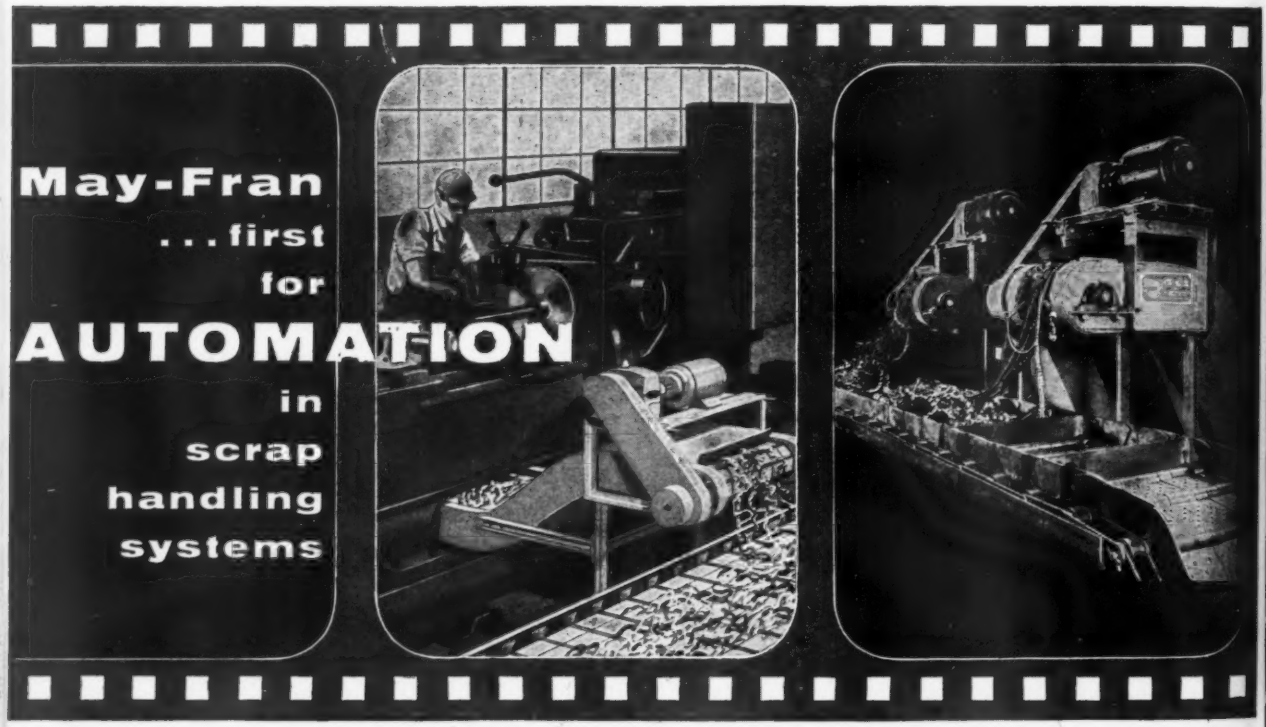
The chain broach principle provides greatly increased length of broaching "stroke" in a relatively small machine. The Model VCA-10-150 "One-Way" machine stands only 11½' high but has an effective broach length of 12'10".

Equipped with a completely mechanical drive including variable speed unit, the machine has infinite variation of cutting speed from 10 to 50 sfpm, permitting the broaching of a wide variety of materials at optimum cutting speeds. Pulsations and vibrations sometimes incurred in other drive systems are eliminated by the mechanical drive.

Versatility is further enhanced by the wide face for mounting broaches on the chain-mounted rams and the wide work platen to handle indexing or stationary fixtures. These features permit installation of multiple tooling for simultaneous broaching of the same or different parts side by side. If parts being broached require less than half of the available stroke (12'10" on the standard machine), duplicate tooling can be installed in sequence on broach carriers and controls modified to provide two or more complete broaching cycles for each revolution of the chain. Similarly, with suitable broach spacing and control stops, two parts requiring a short stroke and one part requiring a long stroke can be broached side by side during a single revolution of the chain.



Section of housing removed to show details of conveyorized broach carriers.



The CHIP-TOTE conveyor permits complete utilization of machine tools by eliminating shut-down for manual scrap removal.

It handles a continuous flow of hot, wet or dry chips, turnings and borings from any multiple spindle automatic machine.

VERSATILE THREAD ROLLING MACHINE HAS MANY FEATURES

Designed for the production of strong, accurate threads of excellent finish in a chipless cold forming process, the "Lanhyrol" thread rolling machines will be the feature attraction in Booth 1406 at the Machine Tool Show. Being shown by Landis Machine Company, Waynesboro, Pa., these machines will be equipped with different tooling daily to permit thread rolling demonstrations on a variety of workpieces.

The Lanhyrol thread rolling machine features a two-roll (cylindrical thread die) design with the work blank being supported in position between the rolls on a work-rest blade or holding fixture. With suitable rolls the machine is designed to produce 3/16″ to 3″ threads of all types, left or right hand, with the exception of square threads and threads of high taper. Hopper and magazine feed are available for parts of less than 7″ in overall length.

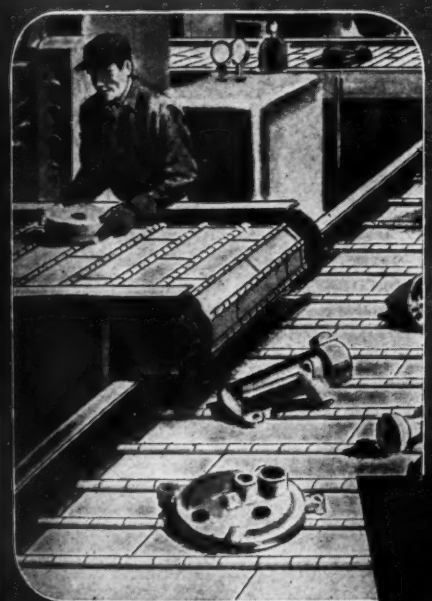
The machine produces threads by four distinct methods of rolling as required by conditions of workpiece design or material hardness. Infeed rolling can be accomplished manually or automatically through the use of rolling and loading timers. Thrufeed rolling is used when producing threads longer than 5⅞″. Continuous rolling provides the highest rates of production for workpiece ¾″ or less in diameter with a maximum overall length of 7″ and of medium hardness. Reciprocal rolling is designed for producing coarse pitch threads on materials of relatively high hardness such as worms or helical gears.

NUMERICAL CONTROL OF JIG BORERS

Numerical control of jig borers will soon be a reality, according to Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Conn. A jig borer has been developed in which numerical information is fed into the machine to cause the work table to automatically position itself to 0.0001″ accuracy. For production operation, locating instructions for the hole coordinates can be stored on punched cards or tape, which the machine automatically translates to position or reposition itself.

Maximum time required to simultaneously set the table longitudinally and the carriage transversely is 15 seconds. One of the control units used to effect table setting will be exhibited by Pratt & Whitney in Space 1219 at the Machine Tool Show.

Development is continuing toward the objective of numerically controlling spindle approach to hole; cutter speed and feed; and boring depth, in addition to automatic positioning of the table.



Now is the time to put AUTOMATION to work . . . Now is the time to cut production costs . . . May-Fran engineers design and build complete scrap handling systems for the automatic removal of machine turnings or chips. May-Fran conveyors will transmit scrap to ultimate point of disposal.

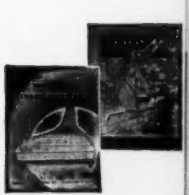
Press Scrap systems can be made completely automatic. Hinged-steel belt will take scrap from presses, handle it through blanking, shearing, forming and baling processes, and deliver it to rail cars.

May-Fran is prepared to engineer, fabricate and install complete conveyor systems to your specifications.

Write today for complete information on how an automatic scrap removal system will cut your production costs.

Bulletin MF-530 describes the new Hinged-Steel conveyor belt.

Bulletin MF-640 describes the Chip-Tote conveyor which removes scrap from operating machines.



DESIGNERS AND ENGINEERS OF COMPLETE SCRAP HANDLING SYSTEMS

MAY-FRAN ENGINEERING, INC.

6003-MF

1726 CLARKSTONE ROAD
CLEVELAND 14, OHIO

Hinged-steel belting handles scrap as well as hot heavy and abrasive castings. Belt is economical . . . maintenance-free.

CIRCLE INFORM-A-GRAM KEY NO. 1031

Material: 4340 Steel.
Milling Machine: #4 Cincinnati.
Cutter: 4½" Helicarb Slab Mill.
Spindle Speed: 326 rpm.
Table Feed: .011" per revolution of cutter.
Depth of Cut: ⅛".

On this 4340 ***STEEL*** *application*

Sonnet Helicarb Helical Carbide Slab Mills cut floor-to-floor time 57%

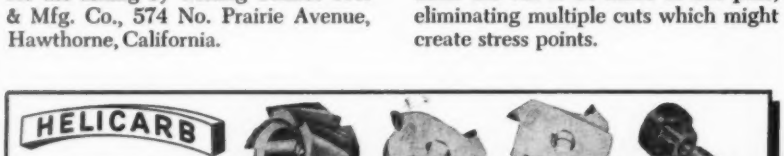
The Talley Machine & Manufacturing Corporation, Los Angeles, uses a 5" "Helicarb" Slab Mill on a ⅛"-deep slab cut. Formerly high speed steel cutters were used for the same operation, completing the cut in 3½ minutes. The change to "Helicarb" Cutters cut floor-to-floor time to 1½ minutes, *enabling two parts to be produced in less time than formerly required to produce one.*

The operator also reported that after 100 parts, "the Helicarb cutter was still sharp; many more cuts could be made before resharpening."

No secret to the amazing efficiency of "Helicarb" cutters. Since the included cutting angle is uniform over the full length of the flute, the cutter cuts with a shearing action as contrasted with the impact of a straight-tooth carbide cutter. Finishes, too, are improved, with 20 r.m.s. and better not unusual.

Right now hundreds of shops are enjoying the competitive advantage these new cutters give them. Why not you? A "Helicarb" Catalog can be had for the asking by writing Sonnet Tool & Mfg. Co., 574 No. Prairie Avenue, Hawthorne, California.

***ALUMINUM* applications show even better results.** Airframe manufacturers and sub-contractors are now using "Helicarb" cutters widely. Above, a standard 4" "Helicarb" Shell Mill, ground with a radius, is used for a simultaneous facing and side milling operation on an aluminum casting at Chrysler Corporation's Los Angeles plant. The 2-inch-long helical flute, possible with "Helicarb" design, enables the cut to be made in one pass, eliminating multiple cuts which might create stress points.

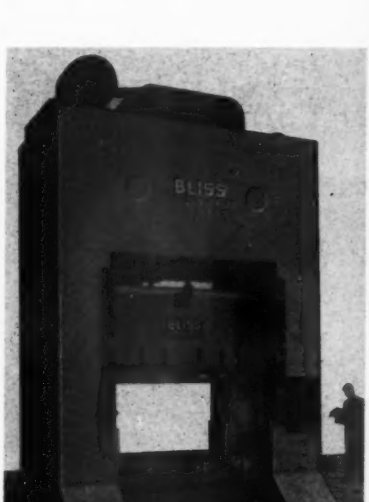


CIRCLE INFORM-A-GRAM KEY NO. 1041

Presses Built for Automation Have Built-In Control

Typical of six new lines of presses designed to aid the automotive and appliance industries in their swing to the automated plant, a Bliss 250-ton two-point press will be exhibited by E. W. Bliss Company, Canton, O., at the Machine Tool Show, Booth 1414.

The presses in this line, two of which feature underdrive design, embody JIC specifications and are completely "packaged", ready for installation. All wiring, piping and controls needed to actuate the many automatic devices mounted on them are built into the uprights. That leaves their exteriors clean and uncluttered, and allows close approach of cranes for loading and unloading.

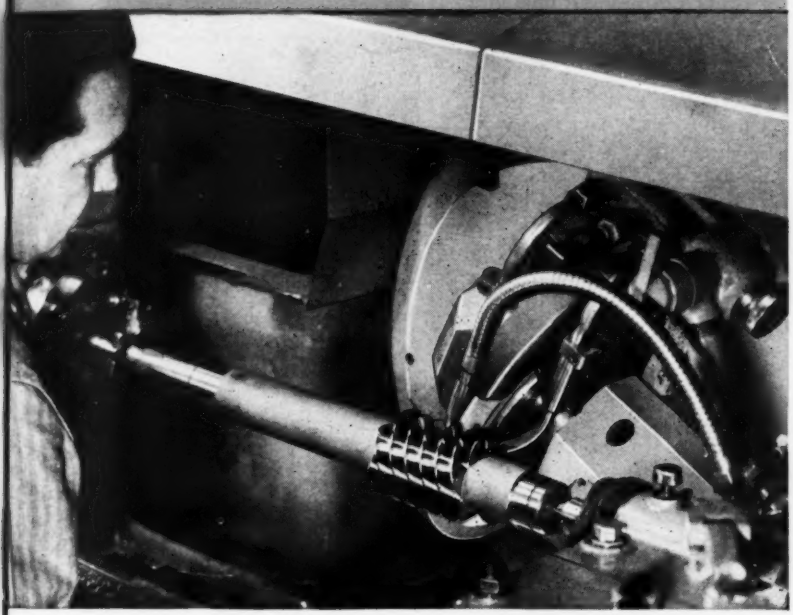


A feature of these presses is the new Bliss Automation Switch. This is a mechanical rotary limiting device designed to control electrically the stopping, starting, interlocking, motion, time, sequence, and recycling of press accessory equipment such as feeders, unloaders, kickers, lifters, and dopers. Designed for high speed operation, it can control nine separate circuits, and give independent and infinite adjustment to each circuit without stopping the press.

55-19

Grinding 5-Start Worm with 4" Lead

STANDARD STYLE 36 EX-CELL-O *Precision* THREAD GRINDER



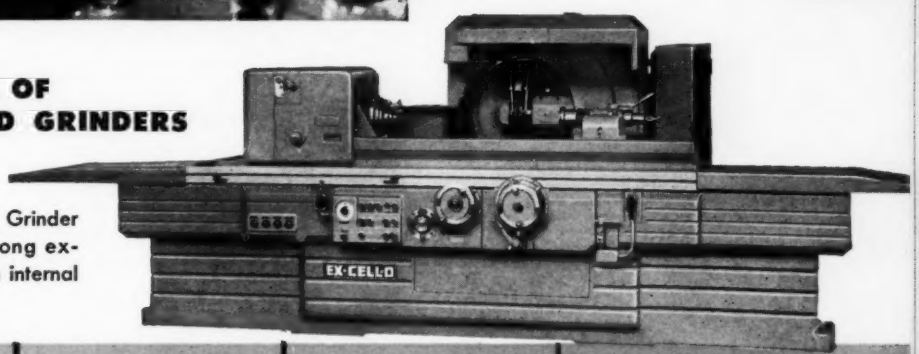
In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.

XLO

SEE EX-CELL-O AT THE MACHINE TOOL SHOW CHICAGO, SEPT. 6-17 BOOTH 1319

A COMPLETE LINE OF PRECISION THREAD GRINDERS



STYLE 36 Precision Thread Grinder —a versatile machine for long external threads, available with internal attachment.

STYLE 50
Precision Thread Grinder—a versatile machine for external work, also available with internal attachment.

STYLE 33
Precision Thread Grinder—a high production machine for external work.

STYLE 39-A
Precision Thread Grinder—a high production machine for internal threads.

STYLE 120
Our largest Thread Grinder. Grinds 10 feet of thread in one setting. Accommodates 12 feet of stock between centers.

EX-CELL-O CORPORATION • Detroit 32, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

55-19

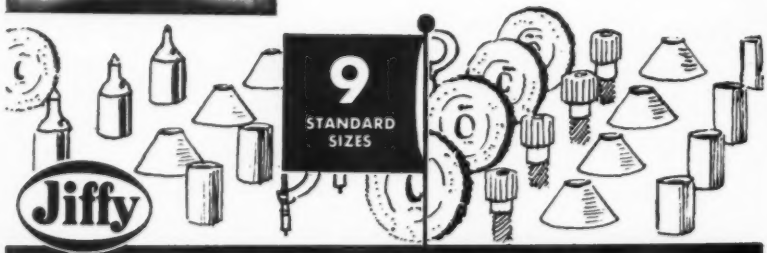
CIRCLE INFORM-A-GRAM KEY NO. 1051

REDUCE PACKAGING COSTS

USE
JIFFY PADDED SHIPPING BAGS
FOR
SEMI-FRAGILE AND NON-FRAGILE ITEMS

- Jiffy Bags Save Packing Time—as much as 76%!
- Jiffy Bags Cut Labor Costs—Insert item into bag—staple or tape. Ready for shipment!
- Jiffy Bags Prevent Damage to Shipments. Reduce claims —create good-will.
- Jiffy Bags Replace Boxes, Wrapping Paper and Dunnage.
- Jiffy Bags are Inexpensive.

Distributors in Principal Cities
Samples and Prices Gladly Furnished



JIFFY MANUFACTURING COMPANY
376 FLORENCE AVE. HILLSIDE, N. J.
CIRCLE INFORM-A-GRAM KEY NO. 1061

.0005 HOLE LOCATION IN 3 MINUTES

YOU NEED THIS TOOL EVERY TIME YOU USE A DRILL CHUCK or BORING HEAD in a VERTICAL MILL, HORIZONTAL MILL or JIG BORER, if the hole is located from a surface that has been machined.

$10.00
With Case

A well known aircraft manufacturer has more than 100 of these edge finders.

This edge finder rotates in the machine spindle from 300 to 1200 R. P. M. and it is held in a 3/8" collet or end mill holder.

- NO DOUBT WHEN LOCATION IS REACHED—The lower half jumps sideways 1/32" and continues to rotate there when location is reached. This occurs at the same dial graduation every time.
- NO EYESTRAIN—Location can be seen easily with average light. A source of light is not needed behind this edge finder.
- SHORT DISTANCE REQUIRED FROM WORK TO MACHINE SPINDLE—This edge finder permits the use of short tools without readjusting the machine because its length is only 2½".
- LOCATES FROM FLAT OR ROUND SURFACE.
- LOCATES FROM STEP ONLY .010" HIGH.
- IDEAL TOOL for LOCATING HOLES in DRILL JIGS, DIES, TOOLS and MACHINE PARTS.
- LOCATION IN 3 MINUTES will make possible the machining of a hole, in the same location in any number of pieces. This can be accomplished by using a stop on the machine vise.
- MADE FROM HARDENED TOOL STEEL WITH ALL SURFACES GROUND.

STOCKED BY DEALERS IN MOST PRINCIPAL CITIES

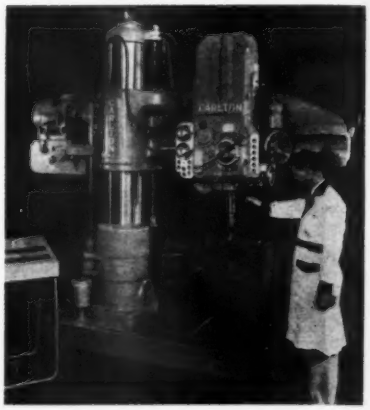
GLOVER MFG. CO. 736 MOHICAN PLACE MEADVILLE, PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 1062

PROGRAMMING UNIT FOR RADIAL DRILLS

Two new devices offer faster and, therefore, more economical hole drilling production. The Carlton-Leber speed-feed pre-selector and program systems will be shown in Booth 919 at the Machine Tool Show by the Carlton Machine Tool Co., Cincinnati 25, O.

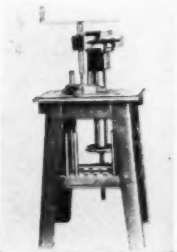
The programming unit—a 20 or 30'-station console type—can be quickly set up with predetermined speeds and feeds and sequence of drilling operations



and controls all machine functions automatically. At any time, changes can be made manually; or, the programming wiring may be disconnected and the pre-selector then becomes operative permitting the operator while one cut is being made to select the speed and feed for the next operation.

NO BREAKAGE

PRODUCTO UNIVERSAL HAND TAPPER



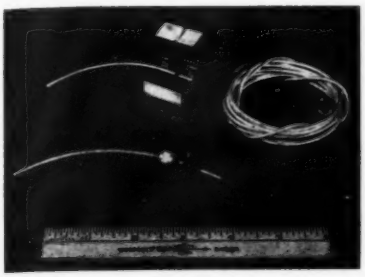
For accurate hole-tapping without tap breakage, this Hand Tapping Machine is a "must" for every tool and die shop and toolroom. You can tap holes at any point in work within area of machine table. Quick-change spindles hold taps. Ready for instant use. Write for Bulletin TE4-102.

The Producto Machine Co.
970 Housatonic Avenue
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1063

Wire Stripping Without Nicking or Damage

This Martin tool successfully strips the insulation from a special wire composed of strands too fine for commercial wire



strippers. The tool contains a recess into which the wire is placed. The stripping blade is set to cut the "Teflon" insulation close to the wires, without nicking or damaging them. When the tool is closed, the wire is rotated and pulled through, thus stripping the end of the wire, and leaving the gossamer strands intact.

AT LAST

You can say goodbye to excessive drill breakage, down time and scrap loss on small diameter, deep hole drilling in a lathe.

Pictured above is a "Drill Ease" at work, drilling a No. 60 hole, ¾" deep in tough stainless steel.

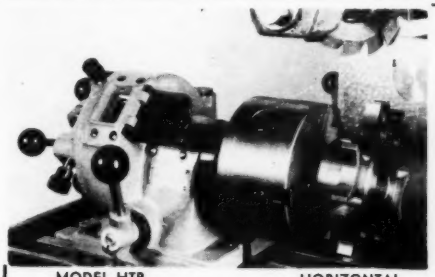
Use it also for precision small hole reaming and tapping. Use it for super-sensitive tapping in a drill press or vertical mill.

Price $24.95 postpaid **Mail order only.**

You must be 100% satisfied or your money will be refunded at once.

D & V SUPPLY 10300 STRATHERN ST. SUN VALLEY, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1071



MODEL HTR HORIZONTAL

ANOTHER **WALTER**

DIVIDING HEAD

Completely Enclosed and Protected Against Chips and Coolant

- Particularly adaptable for Grinding Operations.
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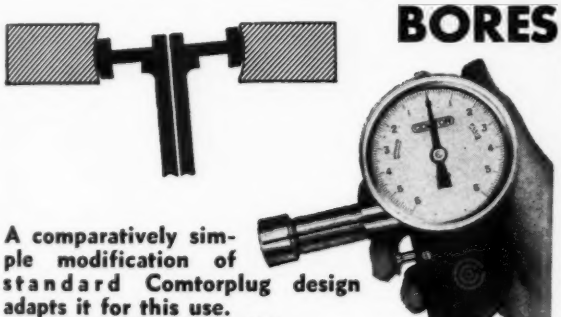
Also Universal, Semi-Universal and Simpler Models and Precision Rotary Tables in various sizes and executions. Each Tool supplied with Test Report. Max. Permiss. error chart supplied with literature.

Sole Agents:

KARL A. NEISE 404 Fourth Ave., New York 16, N. Y., Dept. TP

CIRCLE INFORM-A-GRAM KEY NO. 1072

Can be adapted to gage **SPHERICAL BORES**



A comparatively simple modification of standard Comtorplug design adapts it for this use. STATE YOUR PROBLEM.

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from ⅛" to 8" dia.

UNIQUE ADVANTAGES

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed — not passing—reading.
- Positive 2-point gaging — automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable — no wires, hoses or stands.

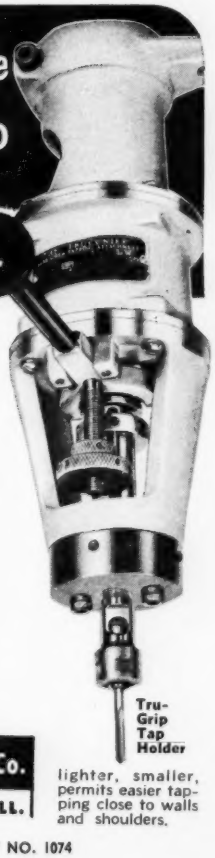
Investigate the gage used by the thousands in jet engine, guided missile, farm machinery, automotive transmission, household appliance and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it —investigate and see why.

COMTOR COMPANY
82 Farwell Street
Waltham 54,
Massachusetts

Get The Facts — Request Bulletin 48

CIRCLE INFORM-A-GRAM KEY NO. 1073

Get the full story of the *newest* MOST ADVANCED TAPPING UNIT EVER DEVELOPED



Illustrated brochure reveals the exciting story of a remarkable new Lead Screw Tapper. Tells how you can now tap with an ease and precision that's unparalleled in tapping history! Graphically shows how each part produced by this lead screw unit is "gauge perfect" — always! There is no variation — ever! You eliminate part spoilage, stripped threads, thread distortion. With the exclusive finger tip control you eliminate operator fatigue, too. Designed on a new operating principle it has many outstanding features: Trigger arm travels only ⅜"; depth held within .005"; depth stop automatically disengages clutch at bottom of stroke; friction clutch prevents tap breakage; hardened and ground lead screw replaces in seconds for pitch changes; unique wiper oils and cleans lead screw while in operation; plus many other features.

Write for your free copy today — now!

Procunier Safety Chuck Co.

12-14 S. CLINTON ST. • CHICAGO 6, ILL.

DEPT. R

Tru-Grip Tap Holder lighter, smaller, permits easier tapping close to walls and shoulders.

CIRCLE INFORM-A-GRAM KEY NO. 1074

INVESTMENT CASTING TECHNICALITIES

Members of the Investment Casting Institute wholeheartedly agreed with the basic premise of its Technical Consultant Dr. Nicholas J. Grant that "small heats make big problems". How to solve those problems of small heats was the theme of Dr. Grant's address at the New York meeting of the Institute.

The Massachusetts Institute of Technology professor of metallurgy explained to the members that there are preferred methods of melting and deoxidation which can minimize many of the more serious problems. But he stressed the point that an awareness of the magnitude of the problem is the first prerequisite to the solution and that the knowledge of the losses of the elements for a given practice is a necessary first step.

"From that point", Dr. Grant said, "close control and a constant realization of the pitfalls associated with variable practices should be sufficient to minimize the difficulties."

Discussing the use of the induction furnace and the carbon arc resistance furnace, he discussed current frequencies and the types of crucibles to use for the best melts. He made a strong point of awareness of the fact that when the crucible is the susceptor, the crucible must always be hotter than the metal. But he warned that there is always the danger of crucible contamination for the higher melting alloys.

Dr. Grant said that the best commercial refractory for general use is MgO. He did point out that alumina crucibles are strong and generally non-reactive with most metals, but are more expensive and tend to crack more severely.

The oxidation of metals is another pitfall against which Dr. Grant forewarned the membership. The metals to which he alluded are those common in the alloying process. Dividing the metals into three groups—A, B, and C—Dr. Grant said that the metals of the latter should be added first to the melt since there is negligible oxidation loss.

This latter group has iron at the top followed by copper, nickel, cobalt, molybdenum and tungsten. Group B metals should be added next and are manganese, chromium, zinc, tin and carbon. The foremost oxidizer of the Group A metals is calcium followed by boron, cerium, magnesium, beryllium, aluminum, titanium, zirconium, tantalum, columbium, vanadium, and silicon.

Six precautions for metals in preparation for melting should be observed. Dr. Grant listed them as freedom from oxide or the preferable use of sandblasted or pickled stock; the use of a dry charge or one that has been dried before adding to the charge; uniform stock with a maximum density to minimize bridging; the dangers of oxidation in gas melting when the hottest oxidizing flame is used; hydrogen pickup in the more reducing atmosphere of the carbon arc furnace; the use of protective covers or protective inert gas atmospheres to

Continued on Page 112

—or, if you prefer, let us tell you the whole story right now—the story of how you can produce more gears and better gears—more splines and better splines—in less time—at lower cost.

Gear-O-Mation* will be shown in operation at the Machine Tool Show. All units are now in production and have been production-tested.

*Trademark

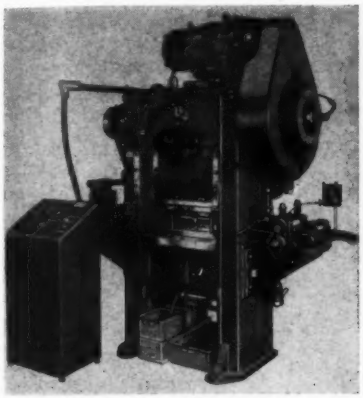
MICHIGAN TOOL Company
from blank to finished gear

7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.
IN CANADA: COLONIAL TOOL CO., LTD.

CIRCLE INFORM-A-GRAM KEY NO. 1081

HIGH SPEED PRESS FOR PRODUCTION OF PRECISION PARTS

Large volume production of small precision electronic parts is assured with this 20-ton, straight side, high speed press equipped with progressive die. The L&J No. 20-2-24 will be exhibited for the first time in Booth 407 at the Machine Tool Show, by L & J Press Corporation, Elkhart, Indiana.

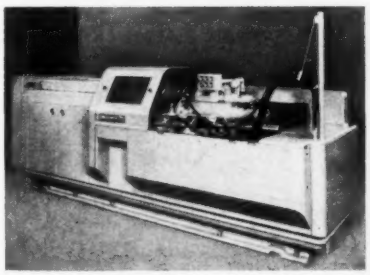


The press has a maximum speed of 450 strokes/min.; air clutch with controls for inching, single stroke, and continuous running; adjustable rotary limit switch; micro-switch in die interlocked with clutch control; and many other features.

TRACING LATHE HAS SEQUENTIAL CONTROL FEATURES

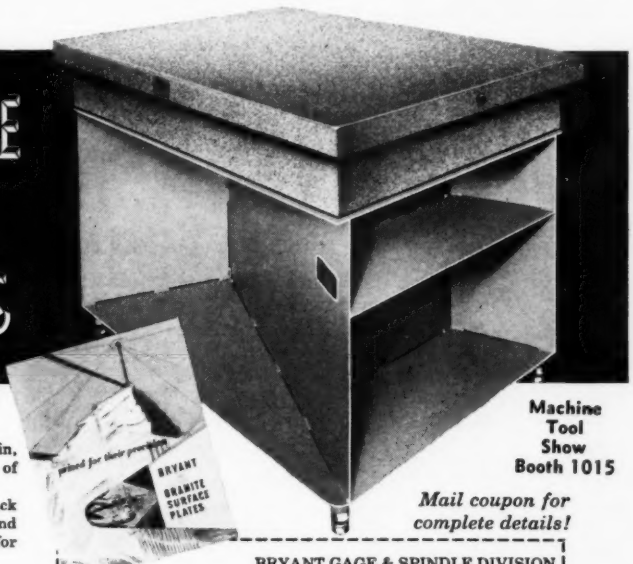
A new concept of tracing will be seen in Booth 1111 at the Machine Tool Show. Being exhibited by Jones & Lamson Machine Co., 40 Woolson St., Springfield, Vt., the J & L Heavy Duty Automatic Tracing Lathe is a sequentially controlled machine that will hog off metal up to ½" in depth on two, three, or four automatically controlled tracing cuts.

The two-position automatic indexing tool holder on the tracing slide of the carriage permits heavy roughing with one tool and extremely accurate finishing cuts with another. A 12" back arm can be set to rock in anytime during the carriage cycle for rough or finish facing, and for cutting grooves. Tool relief is automatic on all finish cuts.



Feed and speed change may be effected automatically during a cut, insuring optimum cutting speeds on changing diameters and angles.

BRYANT GRANITE
ROCK OF AGES
SURFACE PLATES



unexcelled for wear resistance

Bryant Granite Surface Plates are finished on the "head" of the grain, a patented process. This feature ensures a long wearing surface of uniform density and durability.

Low in cost, Bryant plates are made from selected fine grain black and white granite and are ideally suited for inspection, layout and assembly work. Convenient stands featuring 3-point mounting for plates are available.

doubly guaranteed

Bryant, maker of precision machine tools and gaging equipment, unconditionally guarantees every plate for specified flatness.

Rock of Ages, the world-famous quarry, guarantees the granite itself, for perfect grain, close-knit composition and flawless texture.

BRYANT GAGE & SPINDLE DIVISION • Springfield, Vermont, U. S. A.

Internal Grinders • Boring Machines • Internal & External Thread Gages
Groove Gages • Granite Surface Plates
DIVISION OF BRYANT CHUCKING GRINDER CO.

Machine Tool Show Booth 1015

Mail coupon for complete details!

BRYANT GAGE & SPINDLE DIVISION
Box 620 H, Springfield, Vermont

Gentlemen:

Please send me your free folder describing Bryant Granite Surface Plates.

Name_____ Title _____

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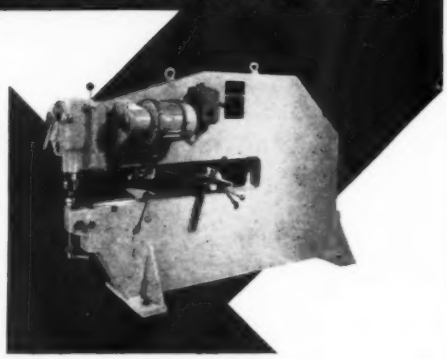
CIRCLE INFORM-A-GRAM KEY NO. 1091

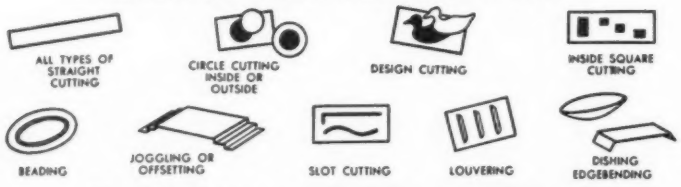
YOU'LL BE AMAZED at what PULLMAX DOES in metalworking

1 machine can do all these jobs in your shop

Ask any Pullmax user and he'll usually say, "I don't know how we ever got along without it." 7 sizes of Pullmax cut mild steel up to 1½". Pullmax does all the jobs shown here and generally pays for itself in three or four months by saving time, labor and material.



PULLMAX DOES ALL THIS WORK

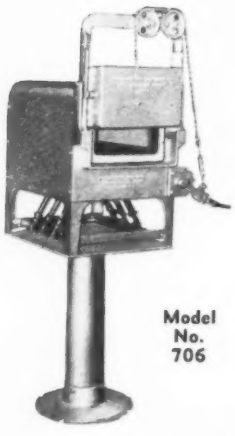


SEE US AT BOOTH 120—COLISEUM MACHINERY SHOW

AMERICAN PULLMAX COMPANY, INC.
2469 North Sheffield Avenue • Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1101

MORE FLEXIBILITY IN YOUR SHOP



Harden, heat treat, temper and anneal with one furnace . . . the Johnson No. 706.

Another in the Johnson line of dependable gas equipment has won its place in both large and small shops and plants. Operators like its easy adaptability. Six Johnson Direct Jet Bunsen Burners with individual shut off valves and pilot lights provide steady, easily controlled heat from 300 to 1850° F. Semi-muffled type with burners operating below Carbofrax hearth. Firebox: 7" x 13" x 16½". Also available bench style. Write for complete and factual information.

A smaller version of this highly flexible furnace is the No. 654. Four burners deliver 300 to 1800°F. Firebox: 5" x 7¾" x 13½". Available as pedestal or bench style.

Model No. 706

JOHNSON GAS APPLIANCE CO.
575 E Avenue, N. W., • Cedar Rapids, Iowa

Johnson No. 706 Pedestal Style	$300.00
Bench Style	$275.00
Johnson No. 654 Pedestal Style	$163.00
Bench Style	$138.00

F.O.B. Factory

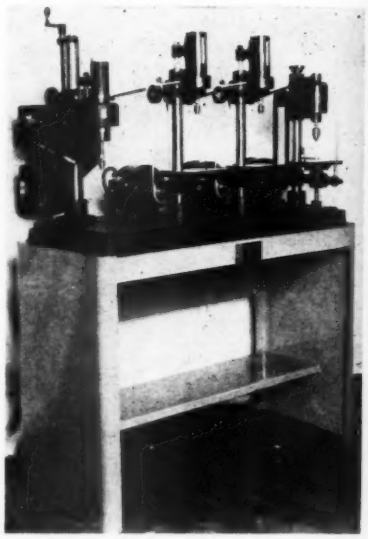
JOHNSON
INDUSTRIAL GAS EQUIPMENT

Furnaces • Burners • Torches • Valves • Mixers • Blowers

CIRCLE INFORM-A-GRAM KEY NO. 1102

SUPER SENSITIVE MULTIPLE SPINDLE MACHINE

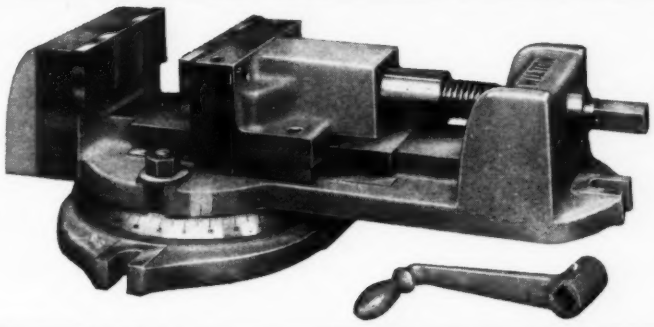
Often it is desirable to perform a series of operations requiring some type of multiple spindle machine. When such operations are to be performed on small parts that require extreme accuracy in drilling, tapping and reaming, a single station setup can be created by a combination of super sensitive machines mounted on a single base, as shown in the illustration, each machine being equipped for a specific duty.



This multiple spindle machine consists of one Hamilton Varimatic drilling machine, two Hamilton "A-M" drilling machines, and one Hamilton tapping machine, all of the super sensitive type, built by The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio.

This machine arrangement is widely used in production line operations usually with an operator at each machine. It has been found that this combination of machines not only speeds up the work, but often results in reducing production costs.

BUY U. S. SAVINGS BONDS



69% MORE CAPACITY AT NO EXTRA COST!

Wilton's new RX-60 has a maximum 6¼" jaw opening, self-cleaning flat bed design, and unconditional 5 year guarantee — yet costs no more than ordinary 6" machine vises! Order Wilton's RX-60 NOW, to improve and simplify production at no increase in tooling cost! There is a Wilton product for every clamping problem.

Attach this ad to your letterhead for a FREE Demonstration or Catalog

"The Finest Name In Vises" TP-8

WILTON TOOL MFG. CO., INC.

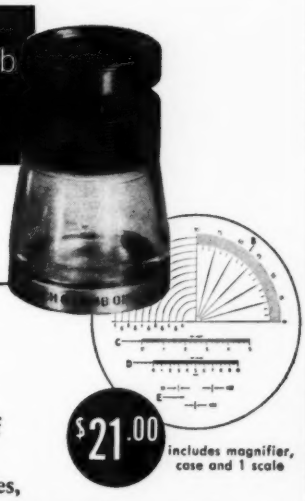
9525 Irving Park Road, P. O. Box 56, Schiller Park, Illinois

wilton tool canada ltd., guelph, ontario, canada

CIRCLE INFORM-A-GRAM KEY NO. 1111

NEW Bausch & Lomb Measuring Magnifier

for Checking, Measuring, Inspecting



7X HASTINGS TRIPLE APLANATIC LENS

$21.00 includes magnifier, case and 1 scale

Make *quick* and *accurate* measurements of extremely small dimensions! Easy-to-use Measuring Magnifier measures radii, angles, diameters, decimal inches and decimal millimeters. One general-purpose and 3 separate scales permit accurate measurements. Magnifier without case or scales, $14. Magnifier, case and four scales, $36. Another precision optical instrument by Bausch & Lomb, available from selected industrial distributors.

WRITE *for complete details. Bausch & Lomb Optical Co., 50444 Lomb Park, Rochester 2, New York.*

BAUSCH & LOMB

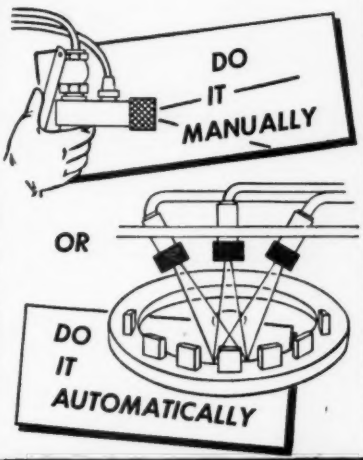
SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 1112

which of these DEBURRING PROBLEMS are yours?

CHECK*

- ☐ Machining slivers
- ☐ Feather edges
- ☐ True burrs
- ☐ Low drilling crowns
- ☐ Associated chips
- ☐ Light extruded metal
- ☐ Tool fuzz
- ☐ Gear teeth
- ☐ Deep holes
- ☐ Spirals
- ☐ Recesses
- ☐ Slots
- ☐ Threads



WITH **PRESSURE BLAST WET BLASTING**

TWO SPEED

** This ad is your coupon. Check off your problem(s) and mail today for free illustrated literature . . . application data . . . case history information!*

THE CRO-PLATE COMPANY INC.

747-L WINDSOR STREET
HARTFORD 5, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1113

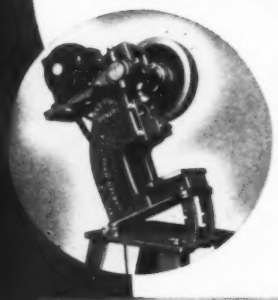
Castings, from page 108

provide protection against both oxidation and hydrogen pickup.

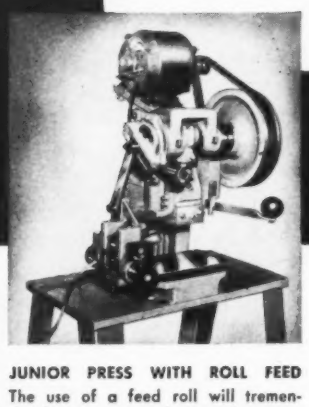
Where oxidation is needed, the metals can be used in the reverse order of the scale as listed by Dr. Grant, but it should be noted that some will create an oxide skin on the melt. Some of the rapidly oxidizing metals, like calcium and magnesium, react almost explosively if they are not plunged under the molten surface. When skins are created, they present a pouring problem and often result in the entrapment of the skins in the castings.

Some recommended practices of Dr. Grant's are: (1) the use of greaseless and dry short-sheared bar stock; (2) the use of Type 304 stainless steel and not Type 321; (3) the taking of all necessary steps to avoid bridging which could result in the overheating of the molten bath at the bottom of the crucible; (4) if stainless scrap is available, add it as the charge melts so that the scrap does not chill the molten bath excessively on sinking into the melt; (5) as soon as the charge is molten, check the temperature by the best means available to avoid overheating; (6) use a constant and tested practice to retain control of the metals to maintain a uniformity in the melts and in the alloys being cast.

PERKINS *Junior* PRESSES

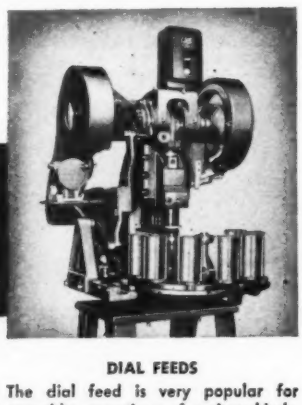


The Perkins Junior is a precision built machine. Costly dies can be run in these little presses with perfect confidence. A variety of frames is available giving whatever die space may be required.



JUNIOR PRESS WITH ROLL FEED

The use of a feed roll will tremendously increase production. An accurate feed roll is available for Perkins Junior presses. The Junior roll feed will take material up to 2" in width and feed from 0 to 3¾". The feed can be mounted on a bolster plate and easily attached to the press. Special feeds for wire are available as well as for extra long work.



DIAL FEEDS

The dial feed is very popular for assembly operations of various kinds. The press is geared to give full pressure at the operating speed of the dial. Production is increased with perfect safety for the operator.

Write today for complete specifications in this illustrated Junior Press bulletin.

• Over Eight Thousand Five Hundred tons of press capacity produced by Perkins in 1954.

PERKINS MACHINE CO.
WARREN, MASS. U.S.A.
TEL: HEMLOCK 6-7771

CIRCLE INFORM-A-GRAM KEY NO. 1121

GLASS MOLDS FOR PRECISION METAL CASTING

Development of a fast economical method for the precision casting of metals through use of glass molds is announced by Corning Glass Works, Corning, N. Y.

The Corning Glascast process, designed especially for work with high temperature alloys, assures an excellent surface finish and the tight dimensional control required in precision casting. Because molds can be used at extremely high temperatures, design of fine detail and close regulation of metallurgical structure is possible.

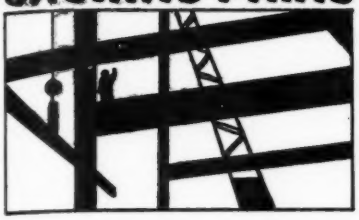
In the test production of items such as jet engine buckets and vanes, 90% of the finished castings have met precision standards on surface finish. The Glascast process eliminates the use of the precoat step in investment casting and the undesirable cracking and spalling which necessitates rejecting a high percentage of the castings.

Easy to use, Corning Glascast powder is essentially a 96% pure silica glass which is mixed with water to produce a casting slip. Poured into a porous plaster form, the slip builds up into a shell which is dried, removed from the plaster, and fired. The mold is then ready for use without further treatment.

Castings produced by the Glascast process have blemish-free surfaces of better than 40 microinch finish requiring little or no further conditioning. The mold material has high chemical stability and does not react with the

Continued on Page 114

GROWING PAINS



Onsrud Machine Works, Inc., a pioneer in the field of woodworking and non-ferrous metalworking machines, has transferred its metalworking machine division to its new plant in Niles, Ill. It is completely equipped with new production machinery.

Plans to expand facilities for the manufacture of "Rockdrawn" tubing, a special type cold finished tubing, have been announced by **Tube Reducing Corp.,** Wallington, N. J. This addition, plus facilities of a recently completed plant, will make available precision cold finished tubing in the range of ⅛" to 17" O.D. and compression formed tubing to 17" O. D.

Ford Motor Company will undertake major additions and alterations to its Cleveland engine plants and foundry to give the company greater Ford V-8 engine production capacity. A fourth post-war engine plant is to be built near Lima, Ohio, in the future.

The Beloit Tool Corp. has acquired a plant in Beloit, Wis. It is to be operated by their Regal division to manufacture high speed ground thread taps.

A new multi-million dollar **Westinghouse Electric Corp.** manufacturing plant, described as "the most highly automatic of any of the company's plants," is to be built at Youngwood, Pa. Expected to be completed by late 1955, it will be devoted to the manufacture of semiconductor devices such as transistors, power rectifiers, high frequency detectors, and photocells.

Vlier Engineering, Inc., manufacturers of tooling accessories, recently moved into a new 12,500 sq. ft. building in Los Angeles.

The Wilton Tool Mfg. Co., Inc., has completed occupancy of its new general office and factory building in Schiller Park, Ill. According to Wilton's president, Hugh W. Vogl, the new structure cost half a million dollars and has a total of 68,000 sq. ft. of floor space.

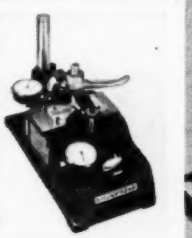
Snap-on Tools Corp. will add 45,000 sq. ft. of floor space to its plant in Mt. Carmel, Ill. Department layout of the plant will be materially changed so that operations in the original building and the new addition will produce maximum efficiency in material flow and handling.

A new West Coast plant for assembly of selenium rectifiers has been announced by **Fansteel Metallurgical Corp.** The South Pasadena, Calif., plant, expected to be in operation this month, will assemble the rectifier cells made in the company's main plant in North Chicago into rectifier stacks for use by the many aircraft, electrical, and electronic manufacturers operating on the Coast.

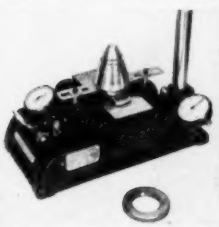
The additional 20,000 sq. ft. of manufacturing space recently acquired by the **Pace Corporation** marks the company's continued expansion. The new building is located adjacent to the main plant and is to be used for precision machining, assembly, and impact extrusion work.

BRYANT B-21 THREAD GAGE

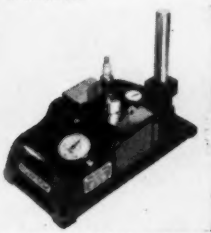
checks internal and external threads 8 to 10 times faster!



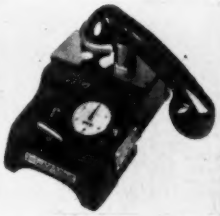
Car door handles—Checking internal groove diameter and the relation of groove to a face.



Shell Noses — Checking internal thread and concentricity of a bore to the thread.



Spark plugs—Checking an external thread and the concentricity of an angular seat to the axis of the thread.



Telephone Handset—Checking external thread.

You can speed up quality control and reduce inspection costs with the Bryant B-21 Bench Gage. Partially turning the work inspects the thread—with utmost accuracy—with visual indication of assemble-ability!

This Bryant gage checks threads in all tolerance classes and in sizes ranging from 5/16" to 5" diameter for internal threads and #8 to 5" diameter for external threads.

The gaging contacts are a pair of threaded segments, which are interchangeable to cover a wide range of diameters. Both "Go Form" and "Pitch Diameter" segments are available. These segments have a much longer life than conventional plugs and rings. Attachments for checking squareness-of-face and concentricity in relation to the axis of a thread are also available.

Write for data sheets on the B-21 Thread Gage and other Bryant gages.

Bryant Gage and Spindle Division, Box 620F, Springfield, Vermont, U. S. A.

Division of Bryant Chucking Grinder Co. Machine Tool Show

CIRCLE INFORM-A-GRAM KEY NO. 1131

Glass Molds, from page 112

metal or its oxides to cause surface imperfections. Accurate control of grain size is thus possible even at metal pouring temperatures as high as 3200° F.

Close dimensional control is assured because the vitreous Glascast powder has extremely low thermal expansion, avoiding the abrupt volumetric changes typical of foundry sands. Tolerances of ± 0.005" per inch can be obtained readily.

Low tool-up costs make short runs possible and shop hold-up time from mold preparation to actual casting is greatly reduced.

Fabrication of Glascast molds requires a minimum of equipment and material. Standard equipment includes a model, containers for slurry, scales, a mechanical mixer, drying oven with temperature control between 105° and 300° F, and a firing furnace with temperature range up to 2000°F. Materials consist of Glascast powder, dense plaster, porous plaster, parting compound and water.

The model of the desired casting may be any machinable material which can be given a high finish and will meet dimensional requirements. The model is embedded in a profile plate incorporating the desired gating, risering, and parting line. Parting compound is applied and dense plaster slurry is poured into the mold box and allowed to set.

From this pattern, working porous plaster molds are formed. A parting compound of Bayberry wax and gasoline mixture is recommended for application to the pattern. The porous plaster mold is poured, allowed to set, and dried between 125° and 140° to avoid calcination and cracking. The finished plaster mold will make from 15 to 20 Glascast shells before surface and dimensional deterioration.

Slip for the Glascast mold is then prepared by measuring four parts by weight of Glascast powder with one part water. A 10-lb batch can be mixed with a high speed mixer in an hour by feeding the powder into the water gradually, or the slurry can be mixed in stoppered bottles on rollers. The slip will last indefinitely as long as it is agitated constantly.

Glascast slip is poured into the porous plaster mold and allowed to stand from 5 to 10 min until enough water has been absorbed to build up a shell of glass solids to the desired thickness. Excess liquid slip is drained off for reuse and the glass shell is dried for 15 min at 140°F. After removal from the plaster form, the Glascast shell is oven-dried at 200°F and then fired for half an hour between 1740° and 1920°F, depending on the strength desired. The Glascast mold is then ready for immediate casing or for storage.

In the actual casting process, the shell assembly can be wired or taped together and backed by loose sand, metal shot or any granular refractory cement. The mold is preheated to the desired temperature for 10 min and is then ready for casting.

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A new bulletin describing in detail both standard and special Lincoln Park Dial Snap Gages is now available. Your copy will be sent immediately upon request.

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Technical Data on More Than 50 Types of Tool Steels and cold finished products make up most of Vanadium-Alloy's "Tool Steel Guide." Sections in the 70-page brochure cover these topics: High speed steel, die steel for hot work, die steel for cold work, carbon and carbon-vanadium tool steels, chrome vanadium steels, and tool steels for special purposes. Sections also are devoted to cold finished products and powdered metal. In addition to the descriptive material, the tool steel sections include data on heat treatment and composition, hardness-after-tempering charts, and lists of representative applications for each type. Get your copy from Vanadium-Alloys Steel Co., Latrobe, Pa., or — **Circle Inform-A-Gram No. C1.**

Both Familiar and Advanced Quenching Techniques are outlined in the treatise, "Houghton on Quenching," prepared by E. F. Houghton's Metal Research staff. Individual chapter headings give some idea of the completeness of the coverage of the subject: "What Happens When Steel is Heated and Cooled"; "Quenching Media"; "Quenching Practices"; "Disadvantages of Straight Mineral Oils"; "Interrupted Quenching"; and "Cooling Methods." The facts are a compilation of research and analytical laboratory tests, supplemented with information accumulated through many years of actual practice in large heat treating plants. E. F. Houghton & Co., Philadelphia 33, Pa.
Circle Inform-A-Gram No. C2.

"Sodium Nitrite for Rust and Corrosion Prevention" covers the use of the product alone to protect metal surfaces, primarily iron and steel, or in combinations of sodium nitrite with such materials as caustic soda or phosphates for dual purpose applications. The text of the booklet, fully illustrated to show commercial applications, describes in detail how the compound protects against rust and corrosion; the use of sodium nitrite in combination with other materials; specific applications; a means of testing working solutions; and how to handle and store the product. An extensive bibliography is included to provide readers with additional sources of information on the many and diverse applications of sodium nitrite in the corrosion field. Get your copy from Solvay Process Div'n, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Circle Inform-A-Gram No. C4.

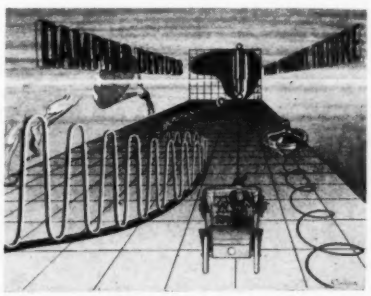
Plan Your Toolroom Heat Treating department with the help of Lindberg's practical new guide. Even if you're enlarging or redesigning instead of starting from scratch, the 24-page booklet should be of value. It describes how to select furnaces of the proper size, shows recommended layouts, gives approximate floor space requirements, and lists auxiliary equipment such as tongs, straightening presses, work benches, hardness testers, etc. All the material is based on information gained from helping design hundreds of toolrooms, plus information gathered from the experiences of Lindberg Steel Treating Co., operators of one of the world's largest toolroom heat treating departments. For a copy, write to Furnace Div'n, Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill., or — **Circle Inform-A-Gram No. C5.**

Meehanite Metal Is Not Just Another Cast Iron, but is the name of a number of irons — 24 in all — each having a different combination of physical properties aimed toward meeting a distinctive need in the casting industry, according to the "Handbook of Meehanite Metals," now available to TOOLING and PRODUCTION readers. The 76-page book gives necessary technical data on Meehanite metal and goes on to explain the manufacture of castings and principles of casting design. Special chapters deal with wear resisting, corrosion resisting, heat resisting castings and also with machinability, heat treatment, and welding of Meehanite. Full information concerning the properties of each of the Meehanite metals is tabulated in the book for easy reference. Get your copy from Meehanite Metal Corporation, 714 North Ave., New Rochelle, N. Y., or — **Circle No. C6.**

Details on the Line of Vitrified Bonded Toolroom Wheels (V40) are given in a folder and wall chart from The Carborundum Co., Niagara Falls, N. Y. Advantages and recommendations for grinding high speed tool and die steels are given. **Circle No. C7.**

"Machinability and Tool Design" of Shelby seamless steel tubing, a 12-page booklet, was prepared as a result of the increasing use of steel tubing as screw machine stock. It covers general conclusions drawn after a series of tests on steel tubing were completed by National Tube Co. While the data is based on automatic screw machine performance, the information is applicable to ordinary lathe work or any of the other machining operations which may be applied to tubing in everyday shop practice. A section on tool design discusses contours, cutting speeds and feeds, and depth of cut for various grades of Shelby steel tubing. Get your copy from U. S. Steel Supply, Div'n of U. S. Steel Corp., 208 S. LaSalle St., Chicago 4, Ill., or — **Inform-A-Gram No. C3.**

The First Comprehensive Book ever written on the history, design, and construction, and operation of damping devices has been published by The Gabriel Co. "Damping Devices — Past, Present, Future" reviews the development of vibration damping devices from the first simple dash pot to today's compact, efficient units for both automotive and industrial use. The colorful booklet includes a complete description of the development and use of closed circuit diagrams and load velocity charts for measuring damping device performance. Write to The Gabriel Co., 1148 Euclid Ave., Cleveland 15, Ohio, or — **Circle No. C3.**



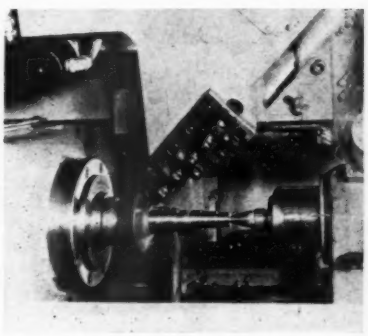
AUTOMOTIVE STEM PINIONS FINISHED IN ONE CHUCKING

A unique combination of hydraulic tracer turning and auxiliary tooling on a rear slide enables automotive stem pinions to be completely machined in a single tracer lathe. The machine built by Hydra-Feed Machine Tool Corporation, Ferndale, Michigan, pioneers a new step in production turning of these key auto parts.

The part, an SAE 4620 forging, is machined at a spindle speed of 1046 rpm and .027″ feed. Turning is done dry or with coolant depending on the machining preference at the several installations.

In order to do the job in a single chucking, including turning the head, carbide driving inserts are used on the spindle and eliminate the need for any chucking arrangement that would interfere with taking this cut. The use of face-drive inserts was introduced to industry by Hydra-Feed several years ago and is now the accepted method of performing turning operations close to the spindle.

Nearly two pounds of metal are removed from each forging during this one setup operation. The rear carriage with its special tooling turns the thread diameter and the head while the tracer turns the stem. Despite the high rate of metal removal, exceptional tool life has resulted for the standard diamond-shaped carbide tools used. This important advantage results largely from the rigidity inherent in the massive construction and the downward tool pressures that are features of the machine's design.



Tracer slide on Hydra-Feed lathe, turning SAE 4620 automotive stem pinion forging. Note use of face driver carbide insert on spindle enabling all machining to be done in single setup. Location of tracer slide and template above work does away with dirt and chip problems that might otherwise interfere with maximum efficiency.

Although metal is removed in large volume, chips do not interfere with maximum operating efficiency. Since the slide and the template are both located on the top carriage, chips drop into the full-width, full-depth chute without lodging on any vital machine components. Nor is there any possibility of soluble cutting oil getting into the hydraulic system and resulting in maintenance problems.

Even with the hand loading used at present, production per

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shift is high because of the rapid cycle, ease of loading due to the fact that the front of the machine is unobstructed by tools or slides, and the short tool change time made possible by this same feature. To automate this installation in the future will be relatively simple. Here again the wide open front allows the installation of standard automation equipment.

Turret Lathe Device Permits Angular Cutting

An ingenious turret lathe machining device which permits angular cutting on the face of a bilge pump impeller has recently proven its worth at Food Machinery and Chemical Corporation's Ordnance Division, San Jose, California. The new device has increased production 50%, while virtually eliminating breakage caused by the former facing method using a sciving tool.

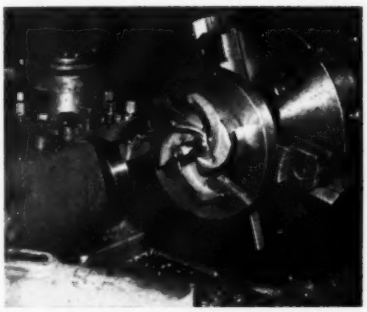

Fig. 1. Cutting tool has just machined a 6° angle on the face of the pump impeller used in bilge pump for an M59 Armored Infantry Vehicle.

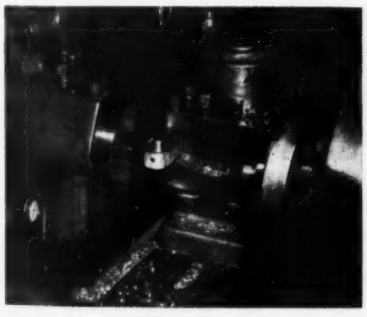

Fig. 2. While turret lathe's cross-slide is allowed to "float," cutting tool is guided by the roller-follower pressure against this concave cam-disc.

Principle behind the new method is a roller-follower mounted opposite the carbide single point cutting tool on the cross-slide. Leaving the cross-slide unlocked allows the proper cutting angle to be determined by the pressure of the roller-follower as it travels from dead center outward across a concave cam-disc locked in the turret.

Chief advantage in the use of the turret lathe is that no change in setup is required, because previous and following operations are done without removing the piece. Since a single point tool is used and cut is begun from dead center, no chatter or noise was experienced.

The pump impeller, made from a phosphor-bronze casting, is machined to a tolerance of 0.0015" with a 6° angle on the face. The pump is used in the Army's water-going M59 Armored Personnel Carrier. This machining method was devised by the division's machine shop foreman Earl Cudney.

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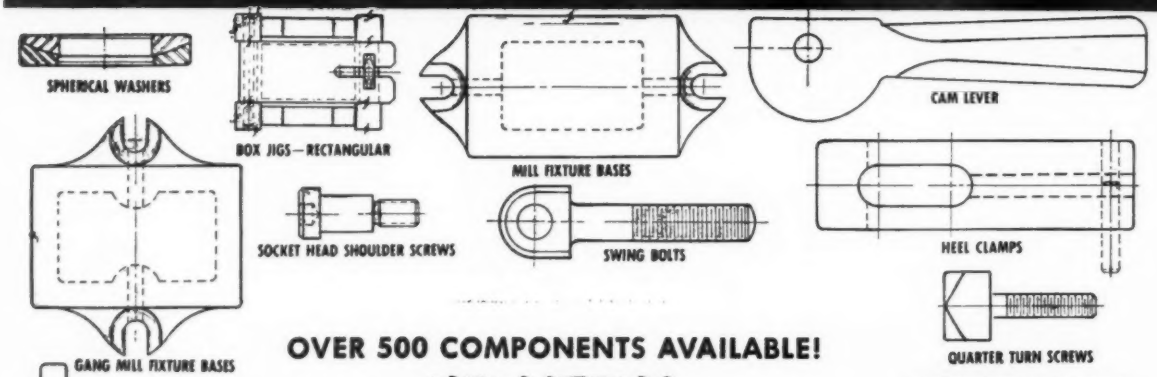

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4	25	46	68	1071	1211	1411	1501	1581	1624	1674	1724	1791
5	26	47	69	1072	1221	1421	1502	1582	1631	1681	1731	1792
6	27	48	70	1073	1231	1431	1503	1583	1632	1682	1732	1801
7	28	49	931	1074	1241	1441	1511	1584	1633	1683	1733	1811
9	29	50	941	1081	1251	1451	1512	1585	1641	1684	1734	1812
10	30	51	951	1091	1261	1461	1513	1591	1642	1691	1741	1813
11	31	52	961	1101	1271	1462	1514	1592	1643	1692	1742	1831
12	33	53	971	1102	1281	1471	1541	1593	1644	1693	1743	1841
13	34	54	981	1111	1291	1472	1542	1601	1651	1694	1751	
14	35	55	991	1112	1301	1473	1551	1602	1652	1701	1761	
15	37	56	1001	1113	1311	1481	1552	1603	1653	1702	1762	
17	38	59	1011	1121	1321	1482	1553	1604	1654	1703	1763	
18	39	60	1012	1131	1331	1483	1554	1605	1661	1704	1764	
19	40	61	1031	1141	1341	1484	1561	1606	1662	1705	1771	
20	41	62	1041	1161	1351	1491	1562	1611	1663	1711	1781	
21	42	63	1051	1171	1371	1492	1563	1612	1664	1712	1782	

EDITORIAL ITEMS

A1	A20	A39	A58	B18	B37	B56	B75	C6
A2	A21	A40	A59	B19	B38	B57	B76	C7
A3	A22	A41	B1	B20	B39	B58	B77	C8
A4	A23	A42	B2	B21	B40	B59	B78	D1
A5	A24	A43	B3	B22	B41	B60	B79	D2
A6	A25	A44	B4	B23	B42	B61	B80	
A7	A26	A45	B5	B24	B43	B62	B81	
A8	A27	A46	B6	B25	B44	B63	B82	
A9	A28	A47	B7	B26	B45	B64	B83	
A10	A29	A48	B8	B27	B46	B65	B84	
A11	A30	A49	B9	B28	B47	B66	B85	
A12	A31	A50	B10	B29	B48	B67	B86	
A13	A32	A51	B11	B30	B49	B68	B87	
A14	A33	A52	B12	B31	B50	B69	B88	
A15	A34	A53	B13	B32	B51	B70	C1	
A16	A35	A54	B14	B33	B52	B71	C2	
A17	A36	A55	B15	B34	B53	B72	C3	
A18	A37	A56	B16	B35	B54	B73	C4	
A19	A38	A57	B17	B36	B55	B74	C5	

Which article in this issue was of most interest to you? _____

_____

FIRST CLASS
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BUSINESS REPLY CARD

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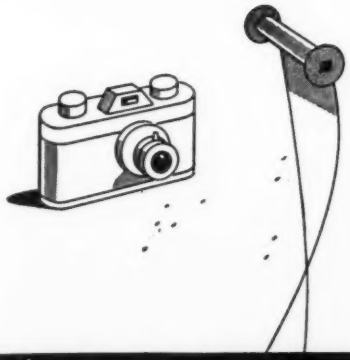
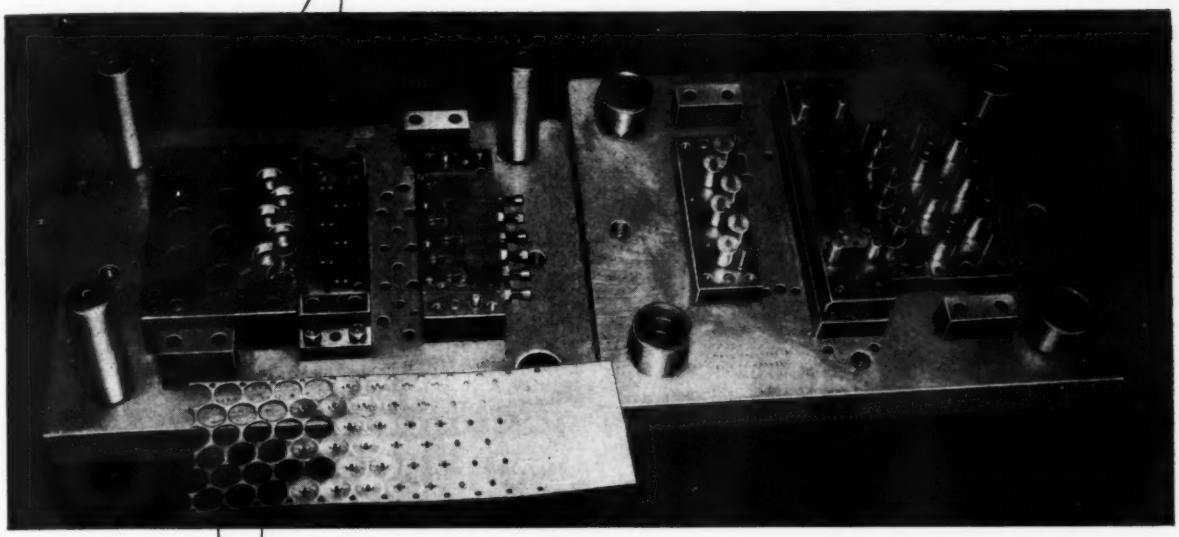
CLEVELAND 18, OHIO



Over 150 Million Stampings from this ONTARIO Die



600,000 Film Spool Flanges PIERCED, EMBOSSED, STAMPED and BLANKED per Grind

Production engineers at an eastern camera manufacturing plant have reported excellent results from their Ludlum Ontario film-spool-flange die. The Ontario die performs the multiple operations of piercing, embossing, stamping, and blanking.

Operating at 130 strokes a minute, the big die has produced over 150,000,000 parts. Runs as high as 600,000 have been made between grinds. For this operation, Ontario is air cooled from a temperature of 1850 F, then tempered at 350 F for six hours. This results in a Rockwell C hardness of 60-62.

Ludlum Ontario is an air hardening die steel of the high carbon/high chromium type. It has all the desirable properties of such steels—resistance to abrasion, high hardness and excellent non-deforming characteristics. In addition, it is tougher but easier to machine than the higher carbon/high chromium types which are usually oil hardening.

For the finest in tool steel to help solve your cutting, forming, or blanking problems, call your nearest A-L office or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*

Write for your
ONTARIO BLUE SHEET

A concise 4-page booklet of facts on the handling and shop treatments of Ontario. Included is complete information on forging, annealing, tempering, etc. and detailed laboratory data on physical characteristics. *Ask for your free copy.*

Address Dept. TP-68

For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 5348

AL ® FINE TOOL STEELS SINCE 1854

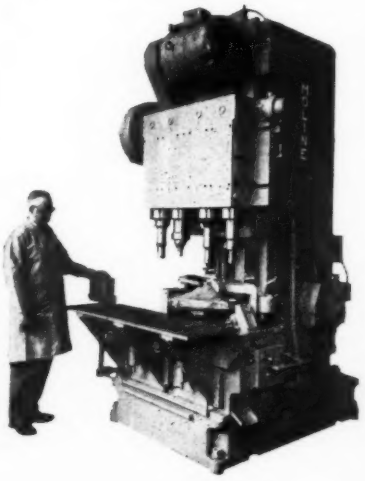
CIRCLE INFORM-A-GRAM KEY NO. 1191

BORING MACHINE CONVERTED TO NEW USE BY RETOOLING

Adapting a special purpose machine to a new use of retooling and new fixtures has been accomplished by the Moline Tool Company, Moline, Illinois.

The machine, a hydraulic boring machine, was formerly tooled for boring engine block cylinders or engine cylinder liners. The new problem was to adapt the machine to rough and finish bore, counterbore, face, and chamfer two large holes in drive housings used on combine harvesters.

The problem was solved by equipping the machine with four anti-friction bearing spindle heads to which were attached flange mounted boring bars. Hardened and ground steel double V-guide ways were used on the machine column and hardened and ground steel wear plates installed on the slide.



A 2-station, power-shifting fixture was developed into which the drive housings are loaded. The housings are located in the fixture on previously milled surfaces, and are held securely in place by hand operated clamping screws.

A separate, adjustable pressure hydraulic pump, independent of the hydraulic feed pump for the machine cycle, is used to shift the fixture from the roughing to the finish boring position. The hydraulic pressure remains on the shifting cylinder to hold the fixture firmly against positive end stops during each boring operation. Locating plungers were provided for the fixture location in each of the two working positions.

At the first station the rough boring operations are completed and then the fixture and housing are automatically shifted to the second station where finish boring takes place also as part of the automatic cycle. The workpiece is then unloaded and the fixture automatically shifted back to the first station to receive the next housing. The fixture shifting is interlocked with the machine cycle for safety of the machine and operator.

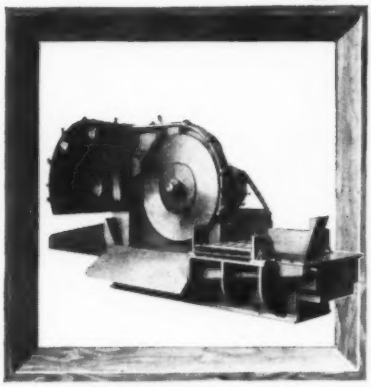
Atkins Saw division of the Borg-Warner Corp., Indianapolis, has announced the appointment of the E. F. McCarthy Co., Inc., as the Atkins industrial distributor in the Buffalo, N. Y. area.

You are invited to visit the Kling exhibit at the...

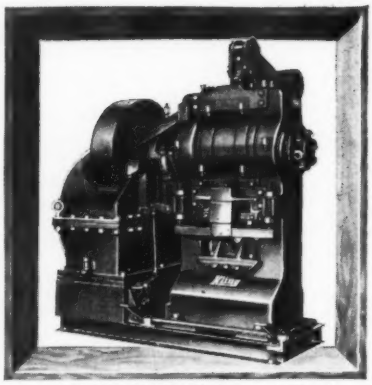
COLISEUM MACHINERY SHOW

Booth 453, COLISEUM, Chicago Sept. 6 to 17, Incl.

Friction Sawing **Guillotine Shearing**



KLING FRICTION SAWS . . . 10 Sizes
Size 4200 Illustrated



KLING GUILLOTINE SHEARS . . . 5 Sizes
No. 4 Illustrated

Both Attain New Popularity Due to Recent Kling Improvements!

KLING FRICTION SAWS make possible faster cutting of steel shapes (structurals and solids) without changing set-up. Also, new KLING developments provide semi-automatic controls for regulating the speed of the carriage and introduce other valuable advancements. Ask for list of users in your industry and send for Bulletins 4200 and 9200 giving you full technical data.

Both are winning more and more "Production Oscars"

KLING GUILLOTINE SHEARS have been completely redesigned to assure users an even wider range of capacities and still sturdier construction. Some of the latest features include fully enclosed power drive and speed reduction unit . . . high tensile strength ductile frame on shear unit . . . shock-resistant alloy tool steel blades . . . new type guarding . . . and welded steel construction base.

Ask for Bulletin 100 illustrating and describing Complete Kling Line of Metal Working Machines.

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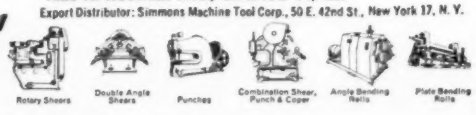
1320 N. KOSTNER AVE., CHICAGO 51, ILL.
Export Distributor: Simmons Machine Tool Corp., 50 E. 42nd St., New York 17, N. Y.



CIRCLE INFORM-A-GRAM KEY NO. 1201

To serve the heavily industrialized areas in and around Chicago and Milwaukee, Hydra-Feed Machine Tool Corp. has appointed **Neff, Kohlbusch & Bissel, Inc.,** Chicago, to handle sales and application engineering of Hydra-Feed automatic and tracer lathes.

◆

Roger H. Watkins has joined the Cleveland sales staff of F. J. Stokes Machine Co. as a senior sales engineer. For the past five years he has been a sales representative for Stanley H. Smith & Co., manufacturers' representatives.

◆

New district managers for the Pittsburgh and Atlanta offices have been named by the Warner & Swasey Company's Machine Tool Division. **Richard E. Pfunder** now heads the Pittsburgh territory and **Leonard J. Fox** heads the Atlanta district, succeeding Mr. Pfunder there.

◆

The newly-appointed sales and technical engineer in the Los Angeles territory for Speed-D-Burr Corp. is **William T. Elmas.** Mr. Elmas, recently moving West from Connecticut, has had long and varied experience with Eastern barrel finishing equipment manufacturers.

◆

J. Russell McGee has been appointed manager of distributor sales by Danly Machine Specialties, Inc., Chicago. Mr. McGee has spent 17 years in the industrial distribution field, serving formerly as Midwest district sales manager for Skil Corp.

◆

Two appointments to the Heller Brothers Co. sales staff were announced recently by **A. M. Thomas,** director of sales at the files and tools manufacturing firm. **Jack Royce** is now territory representative in the Philadelphia area and **Walter Dawson** is a sales representative in the Chicago area.

◆

John K. Light has been appointed to the newly created position of assistant sales manager by the Arcos Corp., Philadelphia manufacturer of welding rods and electrodes. He was formerly New England district sales manager for Arcos. **James A. Brickett, Jr.** succeeds Mr. Light in New England.

Ipsen Industries, Inc., has appointed **Robert Krogh** as sales manager. Mr. Krogh has been with the Ipsen sales staff since 1950 and during this time has served as sales engineer and district sales manager in the Detroit and Cincinnati territories.

◆

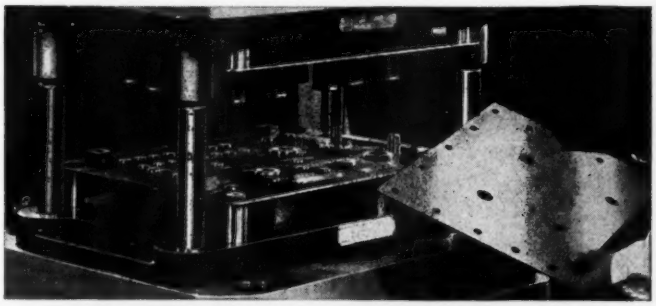
Harry L. Smith, Jr. has been elected a sales vice president of Aluminum Co. of America. He now assumes responsibility for directing the activities of Alcoa's New Kensington and Cleveland sales development divisions and the company's division of commercial research.

J. James Mudd is now assistant manager of field engineers and sales at The Bellows Co. In this position, he is responsible for the administration of field sales and service as well as the coordination of Bellows' nationwide field organization.

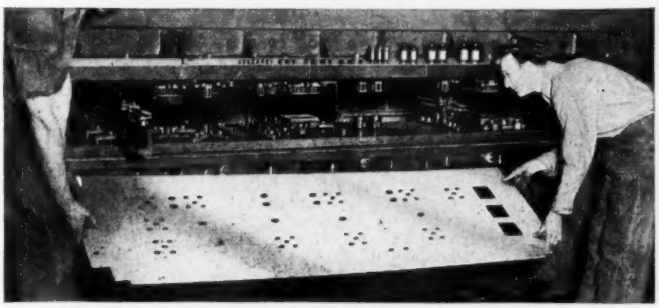
◆

Lincoln Engineering Co., St. Louis manufacturer of lubrication equipment, has appointed **Joseph J. Jenkins** to the position of sales manager, Industrial Division, after 15 years with the company. Mr. Jenkins served previously as national service manager.

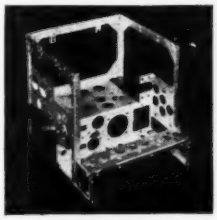
OVER 2,000 PLANTS *are making up their Metal Perforating Die Sets by Whistler methods*



WHISTLER **MAGNETIC PERFORATING** DIES



WHISTLER **ADJUSTABLE PERFORATING** DIES



- Lower die-making costs.
- Start production quicker.
- Save work handling labor.
- Increase press production.
- Versatile in job application.
- Perforate materials to ¼" thick mild steel.
- Combine horizontal and vertical perforating operations.
- Work in practically any size or type of press.
- All parts re-usable and interchangeable.
- Precision assured on short or long runs.
- Parts interchangeable right in the press.
- Magnetic dies assembled on templates.
- Adjustable dies assembled on Tee slot die sets.
- Save floor and storage space.
- Die investment not "tied up."

SEE FOR YOURSELF *Without Obligation*

Our *illustrated* Catalogs show the simplicity, economy and versatility of Whistler methods. See for yourself why Whistler customers are the biggest names in industry.

WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST

S. B. WHISTLER & SONS, INC.
748 Military Road Buffalo 23, New York

CIRCLE INFORM-A-GRAM KEY NO. 1211

MEN YOU SHOULD KNOW

Fischer & Porter Co., manufacturers of complete process instrumentation, has promoted **Edward J. Querner** to the position of vice president-manufacturing. **Robert A. Stern** is now vice president of the Data Reduction & Automation division of the company.

◆

Huston V. Burdine is now vice president of production for The Glide-In Manufacturing Corp., San Jose, Calif. He formerly served as plant manager.

Announcement of the appointment of **Charles W. Mote** as plant manager of the Dodge Forge plant has been made by **M. C. Patterson,** vice president in charge of manufacturing of the Dodge division, Chrysler Corp.

◆

Thomas Trowbridge, a veteran engineer in the coated abrasives field, has been named assistant general sales manager of the Behr-Manning division of Norton Co. He joined Behr-Manning's sales department in 1922.

Major-General Frank H. Lamson-Scribner, Ret., has been named executive associate to the president of Onsrud Machine Works, Inc. Retired after 36 years of service, Gen. Lamson-Scribner was Commander of the Marine Corps Air Reserve Training Program with headquarters at Glenview Naval Air Station, Ill.

◆

Kearney & Trecker Corporation's board of directors has elected **Henry H. Lentzner,** former manager of the company's special machinery division, to fill the executive position of vice president in charge of manufacturing. At the same time, the company announced that **John P. Bunce,** supervisor of processing, is now staff assistant to the manufacturing vice president.

◆

Ipsen Industries, Inc., Rockford, manufacturers of production heat treating furnaces and equipment, announced recently the appointment of **Donald E. Wingate** as chief engineer.

◆

John R. Moore and **Dr. Robert M. Ashby** have been appointed to the positions of director and assistant director, respectively, of North American Aviation's Electro-Mechanical Engineering department. The department is engaged in developing automatic guidance systems, flight and fire control systems, autopilots, radar systems, and instrumentation for missiles and aircraft.

◆

Albert S. Telkins is now district manager of The Rotor Tool Co.'s Philadelphia office. The Philadelphia territory includes Greater Philadelphia, southeastern Pennsylvania, and the northern part of Delaware.

◆

William H. Kieber, formerly assistant chief engineer, has been advanced to the new position of engineering and sales consultant of The Gabriel Co. In addition to a broad background in automotive damping device application engineering, Mr. Kieber also has had extensive experience in the application of damping devices on metalworking machinery and other products.

◆

Maxwell Co., manufacturers of precision tools, has announced the appointment of **M. C. Hutto** as general manager. Hutto Adjustable Boregages are now being manufactured and sold by Maxwell. At the same time, it was announced that **Elmer J. Kalat** has been appointed Maxwell's chief engineer.

NOW'S THE TIME FOR A Burr-Master*

Yes, when your production gears need deburring and chamfering your answer is a Burr-Master. Capable of chamfering the entire tooth form and root, Burr-Masters are available in a wide range of models to meet every need.

No matter what the length of your production runs or the size gears to be chamfered, the Universal Burr-Master (shown) holds the answer to many of your finishing problems. The newest member of the Burr-Master line, it handles both spur and helical gears as well as straight and involute form external splines.

Complete details in Bulletin 103-60. Ask for it.

*Reg. Pat. Pending

MODERN Industrial Engineering Co.

14230 BIRWOOD AVE. DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1221

MEN YOU SHOULD KNOW

Executive Vice President **William P. Drake** has succeeded **George B. Beitzel** as president of the Pennsylvania Salt Manufacturing Co. Mr. Beitzel will continue his association with the company as a member of its board and will also serve as chairman of the board of the Pennsalt International Corp., a subsidiary.

◆

Robert G. Emrick, formerly executive vice president, has been elected president of Ettco Tool Co. He succeeds his brother, **Melvin H. Emrick,** who is now chairman of the company's board of directors.

◆

Arthur E. Darcy, abrasive belt machine specialist, has been appointed manager of the Machine Methods department of the Coated Abrasives division of The Carborundum Co. As manager, Mr. Darcy collaborates with abrasive belt machine builders to offer recommendations for adaptations of their machines to the needs of industry.

◆

Newly promoted plant superintendent of the Shakeproof division plant of Illinois Tool Works is **Frank Machac.**

◆

Aro Equipment Corporation's board of directors has named **Marquard J. Anderson** to the position of vice president. For the past three years he has served as assistant to the president.

◆

The election of **Frank W. Rickard** as president and general manager of the Mechanics Universal Joint division of Borg-Warner Corp. has been announced by **Roy C. Ingersoll,** B-W president. Simultaneously, **Chester E. Palmer,** former vice president and assistant general manager of the division, was elevated to the post of executive vice president.

◆

Manager of the recently-established New Products division of Clark Controller Co. is **Ben H. Carlisle.** The new division includes two departments: A Development department and a Product Adaptation department.

◆

Five key personnel changes have been reported at The Hydraulic Press Manufacturing Co. **William H. Bennett** is now vice president in charge of sales; **J. W. Arnold,** vice president in charge of manufacturing; **William N. Woodward,** secretary-treasurer; **Robert J. Lindsey,** director of engineering; and **Glen R. Pittman,** sales manager, Hydraulic Power division.

John C. Molinar succeeds **W. E. Loy** as general sales manager of the Union Twist Drill Co. Due to ill health, Mr. Loy asked to be relieved of that part of his duties. He continues, however, as company treasurer.

◆

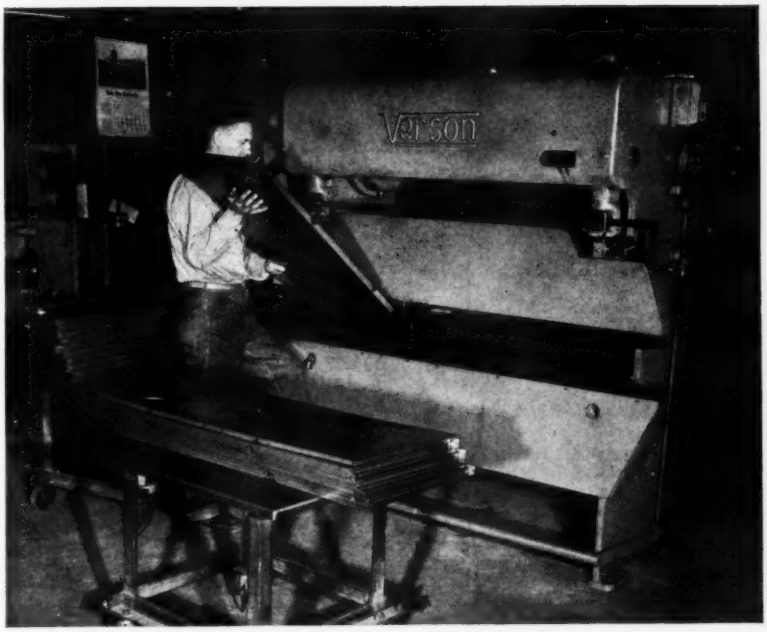
Appointment of **Cecil Latham** as assistant superintendent has been announced by Fulton Sylphon division, Robertshaw-Fulton Controls Co., Knoxville, Tenn. Prior to this, he was general foreman.

The promotion of **Paul W. Norris** to vice president and director of sales of The Denison Engineering Co., has been announced by President W. C. Denison.

◆

Appointment of **Harold Ruehl** as assistant engineer has been announced by Erickson Tool Co., Cleveland. **Elmer Syrene** is now Erickson's special projects engineer. in charge of the new Westberg Colletmandrel line recently acquired by the company.

$2,190* PUTS A BRAKE LIKE THIS TO WORK IN YOUR PLANT



BIG 16 ga. x 78" CAPACITY (25 TONS)

AVAILABLE FROM STOCK

Now you can buy a full power press brake as easily as buying a new automobile. Just pick out the standard model you want, send an order and your brake will be shipped from stock. Two models to choose from — the 16-48 has a capacity of 16 ga. x 48" and is priced at $1,455.00*; the 1062, shown above, has a capacity of 16 ga. x 78" and is priced at $2,190.00*. Write for specifications.

During the Chicago Shows be sure and visit the birthplace of the allsteel press.

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CIRCLE INFORM-A-GRAM KEY NO. 1231

SPECTROGRAPHIC STANDARD SAMPLES OF TOOL STEELS

Spectrographic standard samples of high-speed tool steels are now available from the National Bureau of Standards. Six different tool-steel standards, carefully analyzed and certified as to composition, have been added to the list of over 500 standard samples which the Bureau distributes to analytical and research laboratories for use in controlling chemical processes and maintaining the accuracy of equipment. Designed for calibrating and checking spectrographic methods of analysis, the new standards are complex alloys of iron, chromium, vanadium, molybdenum, tungsten, and cobalt, together with small amounts of other elements.

Since the early part of World War II spectrographic analysis has been extensively applied to the analysis of ordinary steel and non-ferrous alloys. Only recently, however, have spectrographic methods been sufficiently developed to permit analysis of complex alloys such as the tool steels used in high-speed machining of metals. Anticipating the application of spectrographic methods to high-alloy steels and the consequent need for standard samples, the Bureau began planning for the production of standard samples of the steel alloys several years ago. Industry cooperated closely with the Bureau, making important contributions in the planning, preparation, and analyses of the standards. The Bethlehem Steel Company prepared the several heats of metal with the desired compositions and fabricated the metal into rods. The American Iron and Steel Institute recently made a grant to the Bureau to assist the development of spectrographic standard samples; this fund facilitated the completion of testing and analyses of the new tool steel standards.

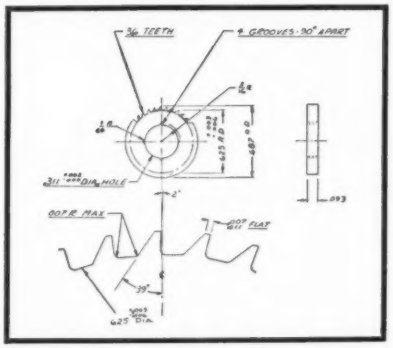
The tool-steel samples are in two forms: rod 7/32 inch in diameter and 4 inches long, and rod ½ inch in diameter and 2 inches long. The surfaces of the rods are finished by centerless grinding. Both forms serve as electrodes for spark excitation in spectrographic analysis.

The rods have a uniform fine-grain structure which results from hot-rolling and annealing of the cast metal. In this condition they can be applied directly to the analysis of molybdenum and tungsten high-speed tool steels prepared in a similar manner and in similar shapes. In applying the samples to the analysis of tool steels prepared by other means or in other shapes, care must be taken to evaluate any possible effects of differences in physical condition on the analyses.

The homogeneity of the rods, both in cross section and along their lengths, was studied by spectroscopic and metallographic methods at the Bureau. The samples were found to be of suitable homogeneity for the elements for which concentrations are certified. Chemical analyses of representative rods were made by Bethlehem Steel Co. (Bethlehem Works), Cleveland Twist

Gaertner OPTICAL INSTRUMENTATION

to measure and check parts like this



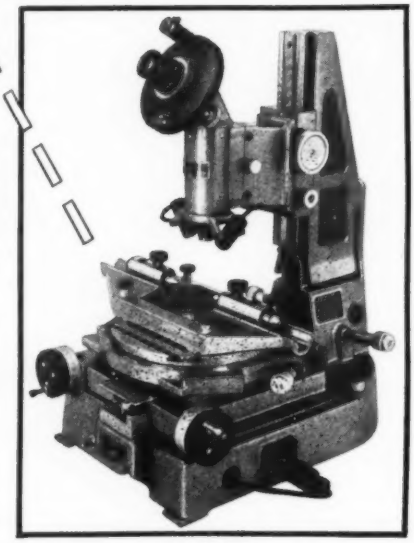
Use the Gaertner Toolmakers' Microscope

FEATURING

Range 2" x 4"
Reading to .0001"
Stage Rotation 360°
Reading to 1 minute
Magnification 30X
Protractor Ocular

ACCESSORIES

Templet Ocular Head
Radius and Thread Templets
Camera Attachment
Magnification 10X to 100X



M2001ARS

Write for Bulletin No. 147-50

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1241

Table 1. Compositions of NBS Spectrographic Standard Samples of Tool Steels

Sample Nos.		Mn %	Si %	Cu %	Cr %	V %	Mo %	W %	Co %
436	836	0.21	0.32	0.075	6.02	0.63	2.80	9.7	—
437	837	.48	.53	—	7.82	3.04	1.50	2.8	2.9
438	838	.20	.17	.17	4.66	1.17	8.26	1.7	4.9
439	839	.18	.21	.12	2.72	1.50	4.61	5.7	7.8
440	840	.15	.14	.059	2.12	2.11	.070	13.0	11.8
441	841	.27	.16	.072	4.20	1.13	.84	18.5	—

Sizes: 400 series; rods 7/32 in. diam., 4 in. long
800 series; rods ½ in. diam., 2 in. long

Drill Co., Crucible Steel Co. (Halcomb Works), Carpenter Steel Co., and the National Bureau of Standards.

The tool-steel standards may be obtained from the National Bureau of Standards for a fee of $8.00 each. A provisional certificate supplied with the standards gives average values of the analyses by the cooperating laboratories. The compositions and sizes of the standards are given in Table 1.

New Hydra Spring Features Built-in Dampening Valve

A built-in valve for dampened return to cushion impact is a feature of the new Wales Hydra Spring recently developed by the Hydra Spring Division of the Wales-Strippit Corp.

This hydra spring with low mass piston provides high frequencies and outlasts and outperforms mechanical springs plus shock absorbers. Using liquid compressibility called Wales Comproils, this small, self-contained, dual action hydra spring produces up to 3,600 lbs force at 1" stroke and is also available with any spring and dampened return force combination.

Wales Comproils develop up to 3000% more force in the same space as mechanical springs, deliver maximum force at any position including zero stroke by built in preloading, and operate at high velocities without natural frequencies.

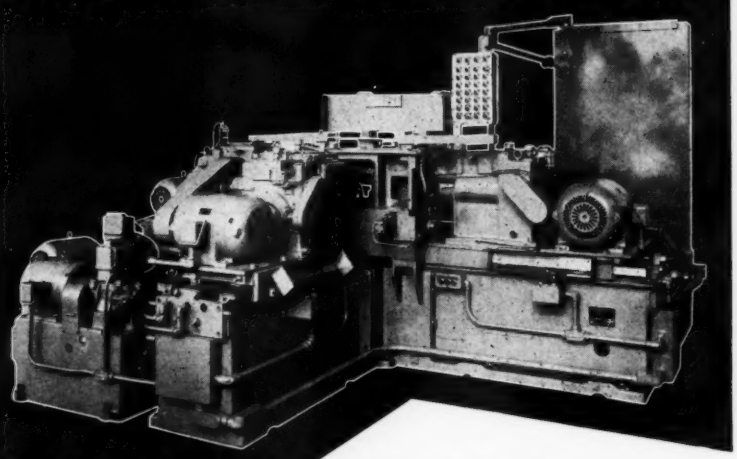
This small, self-contained, dual action hydra spring is only 4¾" long, including 1" stroke, by only 2¾" in diameter.

Gear Manufacturers Elect M. R. Anderson

Marvin R. Anderson, executive vice-president of Michigan Tool Co., Detroit, has been elected president of the American Gear Manufacturers' Association.

Other officers named include: as vice-president, Fred R. Eberhardt, president of Eberhardt-Denver Co., Denver, Colo.; and, as treasurer, G. E. Gunderson, president of Brad Foote Gear Works, Inc., Chicago.

FOR GREATER · · ·
PRODUCTION · EFFICIENCY · SAVINGS



Model MR138 four-way, horizontal machine for boring, counterboring, facing, chamfering and drilling tractor main frame housings.

Use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

Over 50 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

MOLINE TOOL CO. "HOLE-HOG" MOLINE, ILLINOIS

Representatives in principal cities.

103

MOLINE TOOL COMPANY
100 20TH STREET MOLINE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1251

IN-PLANT SLITTING REDUCED STEEL STRIP COST 60%

The perplexing problem of "make or buy" has been solved by one transformer manufacturer who decided to "make"—and in so doing, slashed his slitting costs 60%. Because the narrow strip widths required are unavailable from mills, Instruments & Accessories Company, had to "buy" outside slitting service which was very costly. Now, using a standard production model rotary gang slitter manufactured by the Stanat Manufacturing Company, the transformer producer cut costs, improved product quality, reduced inventory requirements, and speeded production. It is reported the slitter will pay for itself in less than two years.

Instruments & Accessories is a specialist in the field of manufacturing instrument transformers used in conjunction with ammeters, watt-hour meters, and protective relays for the measurement and control of electric power. These transformers are constructed in capacities of from 100 to 6000 ampere primary currents. The heart of each transformer is its wound, grain-oriented silicon steel strip core, selected because of the material's high permeability and low loss factor.

Generally, steel mills do not supply silicon strips in the very narrow width required for most I & A production. Consequently, the company was forced to buy outside slitting service which increased the material cost and, in addition, had a high rejection rate. Inplant slitting considerably reduced this cost and effectively decreased the percentage of rejected material.

Instruments & Accessories installed a Stanat Model S-180, 12" wide Rotary Gang Slitter to slit its own silicon steel strip. Incoming material—coils weighing up to 1,200 lb in varying gages — is mounted on a pay-off, fed through the slitter, and rewound on an automatic recoiler.

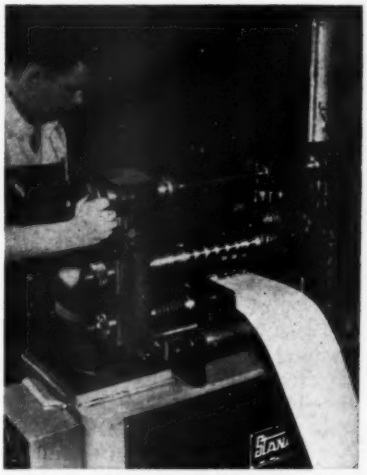


Fig. 1. Closeup of rotary gang slitter being set up for cutting 0.012" × 5/8" silicon steel strands.

Slitter Speeds Production, Improves Quality

Because Instruments & Accessories now slits its own stock to varying specifications, it is able to supply "bid" samples within hours, or deliver a small quantity within a few days. This speed contrasts with the previous time-consuming method of ordering wide stock, sending it out for slitting, and waiting for delivery before transformer production could begin.

ARMSTRONG

The ARMSTRONG Threading Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Each year ARMSTRONG TOOL HOLDERS become more important to you

Every rise in labor costs, every added tax, every overhead burden, every increase in cutting steel prices, every new, more costly machine tool, all increase the importance of ARMSTRONG TOOL HOLDERS to profitable operation.

ARMSTRONG TOOL HOLDERS reduce direct tooling costs to an absolute minimum—"Saves: All Forging, 70% Grinding, 90% High Speed Steel."

ARMSTRONG TOOL HOLDERS reduce tooling-up time to minutes, to the selection and adjustment of the holder and cutter.

ARMSTRONG TOOL HOLDERS permit increased speeds and feeds—produce more pieces per hour per machine tool.

ARMSTRONG TOOL HOLDERS are efficient for they embody a perfection gained by over 50 years of specialization in the development and refinement of tool holders.

ARMSTRONG TOOL HOLDERS are inexpensive because they are quantity produced by modern methods, for a world market... are used by over 96% of the machine shops and tool rooms... are carried in stock for your convenience by all industrial distributors of consequence.

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ARMSTRONG BROS. TOOL CO. "The Tool Holder People" 5320 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

See us at Booth No. 550 Metalworking Machinery & Equipment Exposition, Chicago Coliseum, Sept. 6-17

CIRCLE INFORM-A-GRAM KEY NO. 1261

Fig. 2. Closeup of core plate recoiler being set up for winding 0.012" × 5/8" silicon steel slit strands.

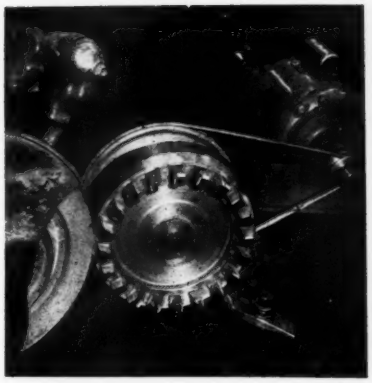
The Stanat slitter virtually eliminates burrs, improves the stacking factor and permits the steel to wrap closer together. Contamination of the strip from lubricants is also eliminated because no lubricant is required with the slitter. The inherent accuracy of the slitter, largely due to a special "floating" upper arbor which aligns the individual upper and lower arbor knives, regularly produces 5/8" width strip with a tolerance not exceeding ± 0.001". Other important factors contributing to the quality of the slit strands are the heavy-duty, high-precision arbor bearings and the single-handwheel worm drive screw-down mechanism which insures perfectly parallel raising and lowering of the upper arbor.

Probably the most valuable feature of the slitter is its core plate recoiler. The core plate method of winding the slit strands has many advantages, particularly in connection with a low-cost "in-plant" slitting set-up for relatively narrow strands. Each core plate has two starting slots, one for thin and one for thick stock, and three radial banding slots.

Another unique feature of the slitter contributing to the quality of the resulting strands is the recoiler tension control. On the Stanat slitter, tension is adjustable through a slip clutch, while the machine is running, by the use of a handwheel conveniently located at the operator's position. Since the winding tension required varies with the type of material, the number of strips being cut, the width and thickness of the strands, and the coil diameter, such ready adjustability of tension is necessary to facilitate perfect slitting results.

Turning Tools Ground In Rotating Holders

A rotating tool holder has been designed by Martin of Baltimore which permits twenty single-point turning tools to be ground at one time. The turning tools are fastened in slots by means of set screws, and the holder is rotated counter to the silicon-carbide grinding wheel. This is five times faster than the old method of grinding tools singly.



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IN RIVETING and CLINCHING
REDUCES LABOR COSTS!
T-J CLINCHOR . . .
one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets square cased nuts in outside quarter panels, left and right hand.
T-J RIVITOR . . .
8" throat . . . feeds and sets rivets with special 10 station indexing fixture. Has air operated hold down mechanism and special air circuit to provide automatic indexing.

AUTOMATIC FEEDING AND SETTING

More and more . . . T-J Rivitors and Clinchors meet today's demands for faster assembly on a wide range of jobs . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to 1/4" long. Air-powered sets aluminum alloy rivets or steel rivets up to 3/4" long. Throat depths 8" to 36".

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

T-J
TOMKINS-JOHNSON
RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS
38 YEARS EXPERIENCE

CIRCLE INFORM-A-GRAM KEY NO. 1271

Obsolete Lathe Solves J-57 Disc Machining Problem

Problem: **Design a machine tool capable of simultaneously turning both sides of a J-57 compressor disc.**

Solution: **Conversion of an obsolete Wickes Center Drive Lathe formerly used in the precision machining of piston engine crankshafts.**

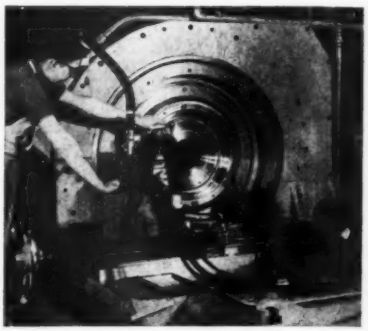
Time: **2,476.1 direct labor man-hours.**

* * * *

Compressor discs for the J-57, world's most powerful production jet engine, are extremely critical parts to machine. At one point the stainless steel narrows to a thin ⅛". Using ordinary T-lathes, the discs have a tendency to "dish" if too much tool pressure is applied, processing time is high because each disc must be turned at least six times during the finish contouring; and scrap has been unavoidably out of proportion.

There are 16 compressor discs in each J-57 engine, each holding a specified number of blades. Disc diameters vary depending on the stage and number and length of blades to be contained.

Thompson Products, Pratt & Whitney Aircraft (designer of the J-57), and Ford Aircraft Engine Division all experienced the troubles outlined in attempting to machine compressor discs. Ford turned the problem over to its semi-production department, which is ready at all times to supply critically-needed parts that manufacturing or vendors cannot handle on an immediate basis.



Production equipment designers envisioned a machine embodying the principles of two T-lathes head to head, with a center drive feature to permit simultaneous machining on both sides of the disc. Machine tools that had been used in the completed piston engine program were examined prior to return to Air Force storage depots. A Wickes center drive crankshaft lathe was chosen as being possible of conversion.

It was late June when production equipment designer Larry Lund started the full design layout. The lathe was stripped to its base, retaining only the center drive feature. New ways and carriages were installed, a hydraulic tracing unit was incorporated and different feed mechanisms with proper ratios were built in. Spindles, speeds, tooling provisions and coolants were revised and adapted.

Now—Lock Your Feed Rates to Protect Machines . . . Reduce Costs with the CROSS Flow Control Lock!

Only authorized personnel carry a key for the Cross Flow Control Lock! They set machine feed rate, then lock it.

Easy to install. Just remove valve nameplate and adjusting lever, reinstall over lock mounting plate.

Available for Vickers ¼" flow control valves and remote control panels.

For full details, write Dept. A78.

- Eliminates Tampering
- Stops Costly Shutdowns
- Prevents Tool Abuse and Breakage
- Protects Machines Against Overloads
- Reduces Maintenance Costs

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1281

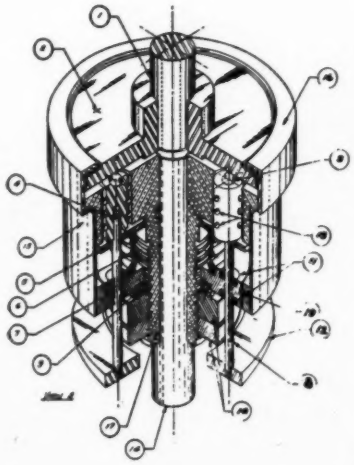
Early in December the machine was ready for its first run, slightly more than five months from the time design layout was begun. The original estimate had been 2,000 hrs of direct labor and the final figure was 2,467.1 — which in projects of this type is considered by Ford to be very close.

As the contour finishing machine now looks it bears little, if any, resemblance to the original crankshaft lathe. Tools work opposite each other at all times, eliminating the "dish" and other distortion problems formerly encountered in single face contouring. Setup time has been decreased 75%, output has doubled, quality has improved tremendously, and scrap losses are negligible.

In the present operation, other machines turn the proper outside diameter on the rough disc forging, and face two flanges. The new tool does rough contour turning. The disc is removed and again goes to other machines for finish boring and flange finishing. Finish contouring is done on the adapted center drive lathe.

Torque Coupling Limits And Fixes Maximum Torque

A mechanical device for controlling and fixing the maximum torque transmitted from a driver to a driven machine is found in the Torque Limiting Coupling designed and built by The Techniflex Corporation, Port Jervis, New York.



Up to the limit to which it is adjusted, the Torque Coupling behaves like a conventional flexible coupling. Beyond this adjusted limit, the coupling permits a free wheeling or slip effect between the driving and driven halves of the coupling.

Three important functional properties claimed with the developed free wheeling or slip effect are, (a) the ability to use the de-coupling action in tripping a safety or emergency switch, (b) the ability to apply the repetitive detent action on which the slip effect is based towards a repetitive "hammer-blow" effect, and (c) its ability to work as a bi-directional torque coupling with independent torque rating for each direction if required. Couplings are available in standard nominal rating from 24 in.-lbs to 100,000 in.-lbs. All couplings are readily adjustable from 50% to 150% of their nominal ratings.

NORBIDE® LONGEST WEARING DRESSING STICK MADE

With one of these handy, lightweight sticks you can quickly and easily keep vital tool wheels in top cutting condition. Just a couple of passes with a NORBIDE Dressing Stick is all it takes to clean up a wheel face, dress a radius or groove or touch up a cup or saucer wheel. And with this conveniently sized stick you can see more of the wheel and thus avoid costly overdressing.

A NORBIDE Stick of boron carbide—the hardest material made by man—will outlast hundreds of ordinary abrasive sticks. You'll find it will greatly reduce dressing dust nuisance also.

Order a supply of these cost-cutting sticks from your local Norton distributor or write for Form 1567 giving more details.

NORTON COMPANY
47 New Bond Street
Worcester 6, Mass.

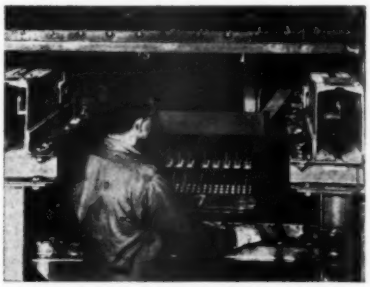
NORBIDE®... *the hardest man-made abrasive*

CIRCLE INFORM-A-GRAM KEY NO. 1291

LONG-LIFE VALVES ALUMINIZED BY NEW PROCESS

Valves for automobile engines are now being aluminized at the Valve Division of Thompson Products, Inc. in Cleveland, by a process that has greatly reduced valve "burning." Performance tests by a leading car manufacturer show that exhaust valve life has been increased from 200 to 500%. The aluminizing line, developed jointly by engineers of Thompson Products and Ajax Electric Company, Philadelphia, produces valve heads with an iron-aluminum alloy facing that has excellent resistance to high-temperature oxidation.

The new "Alspray" process incorporates the following operations: preheating the valves, spraying aluminum on the heads, fluxing and bonding the aluminum by immersing the heads in a molten salt bath, water quenching, acid rinsing, and a final hot water rinse.



Aluminum-sprayed valves are automatically engaged in fixtures and cycled through the Ajax salt bath fluxing furnace, quenching and rinsing baths.

The original aluminum-coating process employed at Thompson was developed by General Motors Research Laboratories under the name of "Aldip." The Aldip process* was used at Thompson in 1954. At that time, aluminum was applied to the valves by dipping them into the fluxing bath, followed by immersion into molten aluminum. It was found that processing costs could be appreciably reduced and production increased by applying aluminum to the valves **before** immersing them in the fluxing bath. Accordingly, in late 1954, the Aldip facilities at Thompson were converted to the new Alspray process (also of General Motors origin).

The Alspray line is almost completely automatic—all operations are mechanized except for unloading the valves from the spraying fixtures, and unloading the finished coated valves at the completion of the process. Preheating of the valve heads by gas torches is followed by a metallizing operation in which aluminum is sprayed onto the heads. The sprayed valves are then automatically engaged in special fixtures which are automatically conveyed through the entire fluxing-cleaning cycle. Heart of the process, a special Ajax 227-Kw salt bath fluxing furnace, has a capacity of 7 fixtures — each valve being in the 1350°F molten salt for approximately one minute.

*See Tooling & Production, March 1955, p. 106.

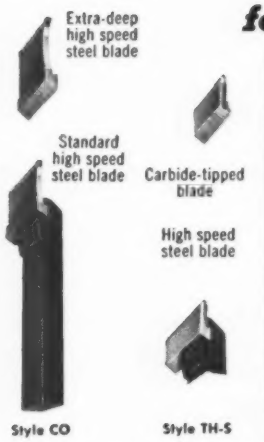
Flexibility

The Keynote of

BOKUM

RAPIDOR TURNING TOOLS

for cutting off and threading



In a recent advertisement, we described the features of Bokum Rapidor turning tools for roughing, semi-finishing and finishing. Here is the remainder of the Rapidor line: tools for external grooving, cutting off and threading.

They feature interchangeable blades—a fact which guarantees extra-long tool life. The unique design of the clamping of the blade and holder makes the tool rigid, eliminates chatter.

Other applications of Rapidor tools feature cutters for turning forms on the shoulders of a shaft, and radius tracer tools. Angular chip breakers, designed to remove chips away from the operator, can be furnished.

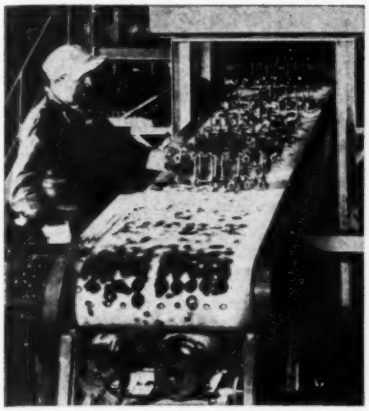
TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO. 14775 Wildemere Ave., Detroit 38, Mich.

Write today for Catalog 454 for a complete description of Rapidor Tools.

1 Long tool life; blades only need be replaced.
2 One holder for all lathe operations; high speed steel and carbide-tipped blades available.
3 Cutting, clearance angles are built into the cutter; constant clearance throughout life of tool.
4 Shape of cross section remains constant.
5 Resharpen top face only.
6 No set-up problems.
7 Rigid, large chip removal—cool cutting action.

CIRCLE INFORM-A-GRAM KEY NO. 1301



Exit end of the Alspray valve-processing line, where aluminized valves are unloaded from the fluxing-cleaning mechanism and inspected prior to shipment.

Many millions of valves have now been aluminized by Thompson Products and the results have been spectacular. They are the first valve manufacturer to utilize aluminum coating, and the new Alspray process promises to be a vital factor in meeting the requirements of today's and tomorrow's high compression engines.

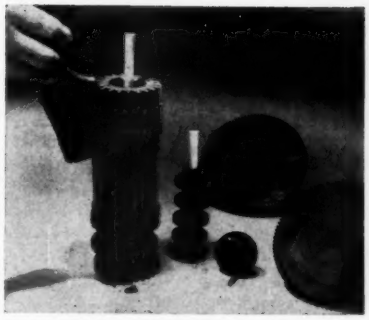
"Painted On" Heat Treating Saves Time

Conservation of heat treating time in steel parts and tool production is the function of Armor-Tuf, a liquid compound which is simply "painted on" the workpieces.

It is no longer necessary to "soak" these parts for hours in furnaces at high temperatures, since only a few minutes near the critical temperature of the steel is required under this process to obtain a hardness as high as 60 Rockwell C, and a depth of 0.003" to 0.010". Greater depths of 0.015" to 0.020" can be obtained in 30 to 45 minutes.

This hardness and depth is obtained through the use of liquid ARMOR-TUF, available from Armor-Tuf Sales Corporation, 299 Madison Ave., New York 17. It is painted on gears, cams, studs, tools, etc., just like cold water paint, and just as easily. After being dried, the pieces are placed in the furnace, and then brought up to 1400° to 1600°, with the above results.

This development permits a continuous line operation in the hardening of parts and tools, and reduces to a few minutes, instead of the usual 3 to 8 hours, the time allowed for hardening steel parts and tools. Parts may be dipped or sprayed if desired.



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And now—PORTER introduces Interchangeable BAL-LOK*
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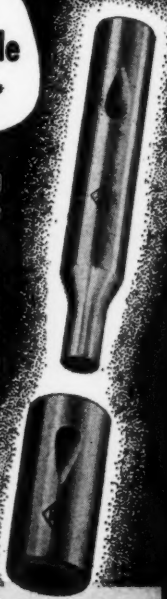
3-P BAL-LOK Punches and Die Buttons are made from High 1.50% Carbon and High Speed Steels . . . Precision ground to the highest quality found on *any* commercial punch!



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Over 37,000 Standard Sizes STOCKED FOR IMMEDIATE DELIVERY. Avoid costly down-time. Write for complete details, today.

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PRinceton 6338 P.O. Box 208 Cincinnati 15, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1311

Fast Milling of Silver Inserts in Plastic Bases

by Richard L. Camp
Machine and Tool Designer
INTERNATIONAL BUSINESS MACHINES CORPORATION
Endicott, N. Y.

WIRE CONTACT RELAYS are vital components of many machines built by International Business Machines Corporation at its Endicott, N. Y., plant. Bases of these relays are phenolic moldings which contain inserts stamped from pure silver furnished by Handy & Harman, New York, N. Y. Silver is widely used for this type of application because of its high conductivity, ease of machining and corrosion resistance. The inserts pass through the central portion of the U-shaped base and have to be machined, usually at both ends, to insure holding the close dimensions specified.

Part of this work is done in a special machine shown in Figure 1. The machine is fully automatic except that the bases are hand-fed two at a time from the table shown in Figure 1 into a gravity chute which deposits them, inserts facing downward, onto a track.

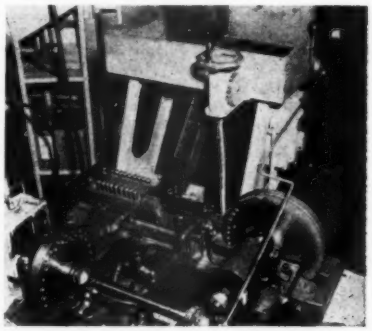


Fig. 1. Molded relay bases feed down the inclined magazine onto the track at left center and are advanced under spring-loaded hold-down covers. During the advance, inserts are sheared by a carbide knife and then are milled at a 45° angle by a milling cutter turning at a speed of 10,200 rpm.

At the right end of this track, as viewed in Figure 1, there is a cam-operated reciprocating slide. Each time the slide is retracted, a pair of bases feeds from the chute onto the track. Then, as the slide moves forward, the bases are fed along the track (to the left) and under a series of spring loaded covers that keep the relay bases seated firmly against the track.

When the bases are completely inside the covered part of the track, they are pressed against a carbide knife that is reciprocated transversely across the track. At this point, the carbide knife, which is ground to an 8° angle, shears each silver insert cleanly, leaving the ends square.

Following this, at the next advance of the pusher slide, the two bases are advanced through a milling station at which there is a 2.050" dia. rotary carbide cutter driven at 10,200 rpm. This cutter mills the ends, previously sheared square, to a 45° angle and finishes the inserts to length.

BUSHINGS When You Need Them
SEND FOR NAME OF REPRESENTATIVE IN YOUR CITY
Precision drilling and reaming requires bushings. When you are called upon to build or service a jig or fixture you need bushings right at hand. A shortage at a critical time can cause lost production.
ACME representatives maintain stocks of over twenty thousand ASA and ACME standard size bushings in many strategically located major industrial areas. You need only phone or wire the ACME office nearest you for immediate delivery.
Precision made by highly skilled operators, you will find that these ACME bushings meet your highest requirements. We suggest that you try Acme for finest drill bushings.
SEND FOR OUR CATALOG AND PRICE LIST
Bushings and all other carefully machined and precision made ACME products. Filled with valuable information for tool engineers—designers—plant executives—purchasing agents.
ACME INDUSTRIAL COMPANY
206 N. LAFLIN STREET, CHICAGO 7, ILLINOIS
Manufacturers of standard dowel pins • Chamfer micrometer gages • Drill jig bushings • Portable bench centers • Roughness comparison specimens • Hardened and ground parts manufactured to order
CIRCLE INFORM-A-GRAM KEY NO. 1321

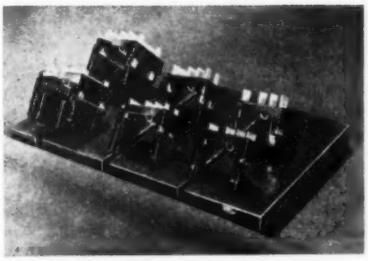


Fig. 2. Three sizes of the bases, before and after machining of the stamped silver inserts. Insert contacts are pure silver produced by Handy & Harman.

Upper group—Before machining
Lower group—After machining

Figure 2 shows three types of relay bases before and after the silver inserts are machined.

The machine cycles 50 times/min. turning out 100 perfectly machined relay bases in that time.

LAYOUT BOARD PRODUCES ACCURATE GAGING CHARTS

Preparing optical gage charts has been facilitated by the development of a chart layout board by Optical Gaging Products, Inc., 26 Forbes Street, Rochester, N. Y.

The chart layout board, featuring an integral T-Sine square, is intended to furnish an immediate method for producing chart gages for contour projectors and comparators.

An aluminum board, 21" square, is accurately jig bored for installing locating pins over which the T-square or the T-sine square can be located. Gage blocks can be located between the T-square and the locating pins to form angles to maximum accuracy.

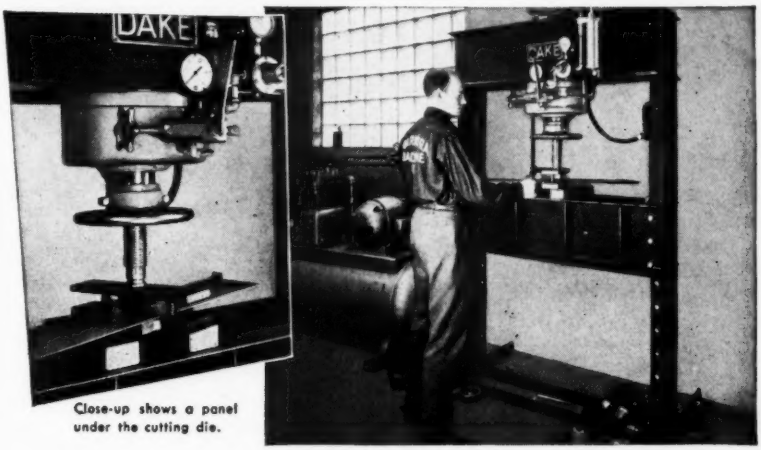
The hardwood carrying case has a cover that slips off its hinges, thus forming a desk and placing the board in a position for immediate use.

Magnification scales fitted in the locating edges of the board permit drawing directly to scale. A selection of OGP glass and plastic blanks accompanies the unit.

The T-sine square, not shown, is a T-square including a rigid machined bar along which the ruling edge slides. The sliding member uses a clamping device to accurately lock and locate the ruling edge in its travel. This permits fast, extremely accurate laying out of coordinates, lines, and angles. Extreme accuracy is also attributed to the jig-bored holes and their locating pins.

Used his head, a $100 die, and a DAKE Hydraulic Press

to reduce cost of cutting job from 88¢ to 9¢ a panel



Close-up shows a panel under the cutting die.

Jerry Denicola of the Marmora Machine Co., Chicago, believes in using his head to make money. The ways in which he uses his Dake Press should be an inspiration to other machinists.

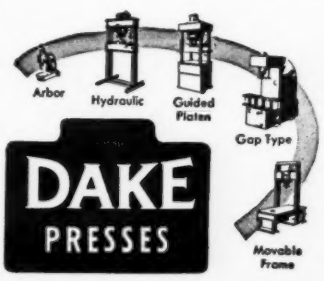
One of his customers makes flame-cutting machines, for which Jerry furnishes steel panels in which an opening must be cut exactly to 1¾" x 2¾" size.

This job was formerly end-milled, and the corners filed square—a job that required a skilled mechanic. Fifty panels cut this way required 7½ hours labor at $2.35 an hour, $17.62 for the run, or 88¢ a panel.

So Jerry made a hardened die at a cost of about $100, and put the job on his Dake Press. Now a run of 50 panels can be cut in 3 hours by a semiskilled mechanic at a cost of $1.50 an hour—$4.50 for the run, or only 9¢ a panel. So every time an order for fifty more panels recurs, there's an extra profit of $13.12 in it!

You, too, can make an extra profit with a Dake Press . . . see your Dake distributor.

Dake Corporation, , 634 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE CORPORATION
634 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Catalog No. 129
Name_____
Company_____
Address_____
City_____ Zone____ State____

CIRCLE INFORM-A-GRAM KEY NO. 1331

SAFE PRESSES MADE SAFER BY NEW AIR VALVE

Increased safety for operators of large metal stamping presses is provided by a new protector air valve recently demonstrated by The Clark Controller Company, 1146 E. 152 Street, Cleveland, Ohio.

At the same time a new anti-repeat control for presses, incorporating transistors instead of moving parts, was revealed.

These new controls are intended for use on all presses which have clutches or brakes, or a combination of the two, operated by air pressure.

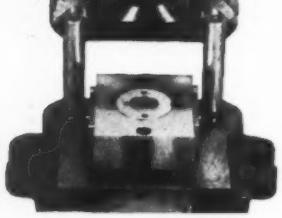
For safety reasons, presses are automatically stopped at the end of each stroke by an electrically operated valve, which exhausts air pressure to release the clutch and set the brake. Another stroke can not begin unless each man working on the press has both of his hands depressing pushbuttons. This ensures that the operator's hands are away from the danger zone while the dies are being squeezed together.

Anti-repeat controls are designed to prevent accidental repeat operations of the press when the operator's hands are not depressing the pushbuttons. If failures in the control system occur—such as power failure, a short circuit or a stuck pushbutton—the press will stop rather than operate unexpectedly.

Descriptive literature is available from the company or **Circle Inform-A-Gram No. D1.**

"HOVIS WASHER DIES have sure solved our troubles!

"You, too, should make washers the economical Hovis way. Save time, labor, materials and storage space"



Made in 5 sizes:
¾"- 1½"- 2½"- 4"- 6"
Write for Literature

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

The modern method adopted by manufacturers nationally . . . These *Patented* Dies provide a Master Holder by which, upon simply and quickly removing and replacing Five, Small Interchangeable Parts, a new size washer may be produced . . . Special sets of parts available for use in these units . . . This method makes possible production of irregularly shaped pieces and shallow draws . . . Multi-Washer Dies designed and manufactured.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD Phone: Slocum 7-4800 VAN DYKE, MICHIGAN Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 1341

HOLLOW-BAR STEEL SHOWS ECONOMIES IN TEST MACHINING

Graphitic hollow-bar tool steel utilized in the making of dies and gages is a recent innovation at The Timken Roller Bearing Company with results showing substantial economies to that firm.

Hollow-bar tool steel is rough turned on the outside diameter and bored on the inside, in sizes ranging from 4" to 16" OD with various inside diameters. These bars come in lengths ranging from 6' to 10'.

The Timken Roller Bearing Company tool room supervisors have found that graphitic tool steel machines approximately 30% faster than other tool steels due to the free graphite in the steel's structure. Drilling and boring solid bars for dies and other purposes is eliminated since the center hole in hollow-bar steel is already there. Wearing qualities of tools made of this material are excellent.

Solid bar stock and forgings were formerly used in The Timken Roller Bearing Company's tool room for dies and gages. On a representative group of 10 machining jobs, ranging from the machining of a master gage to the machining of a multiple perforating die, the average savings in labor costs were 24% when hollow-bar graphitic tool steel was used. Data on these 10 machining operations are shown in Figure 1. Time and money saved on some machining jobs

Product	Labor Cost (Av. 1 pc.)		Savings	
	Solid Bar	Hollow Bar	Actual	%
I.D. Size & Taper Master	$ 1.90	$ 1.40	$ .50	26
Closing-in Die	3.72	2.43	1.29	35
Mult. Wing & Spread Die	2.63	1.54	1.09	42
Mult. Perf. Die	2.65	1.70	.95	36
M.P. Die Top Insert	.77	.64	.13	17
Finish Master Cup	2.32	2.21	.11	5
Ring Master	2.22	1.59	.63	28
Pressure Ring	2.55	2.33	.22	9
Blanker Die	3.77	2.60	1.17	31
Cone Work Cup	3.63	3.35	.28	8
Total Cost and Av. Savings	$26.16	$19.79	$6.37	24%

Fig. 1. Data on labor costs for performing 10 different machining operations, in which comparisons are shown in the use of solid bar stock as against hollow-bar stock. Dollar savings and percentage savings are also shown.

were as much as 50%. During the year 1954, Timken's use of solid bar stock for dies and gages decreased by 28% while the use of hollow-bar tool steel increased by 28%. Figure 2 portrays the percentage change in use from solid to hollow-bar stock by quarters for 1954. Savings in excess of $56,000 were made by the tool room alone by using, wherever possible, hollow-bar tool steel rather than solid stock.

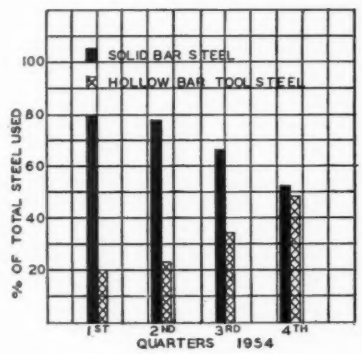


Fig. 2. The chart shows the change in use percentage-wise, from solid bar to hollow-bar stock at Timken during 1954.

Less tangible savings than the 24% average savings on labor costs are: less wear and tear on machinery, reduced inventory of drills, and speedier delivery of graphitic hollow-bar tool steel as compared with forgings.

The successful accomplishment of an effective cost reduction by using graphitic hollow-bar tool steel can be made by assigning the proper sized section to a given job. The less amount of stock to be removed will obtain the highest percent of savings on machining time. Where a choice has to be made on the assignment of graphitic tool steel, as to size, the inside diameter should be favored. Stock removal from the outside diameter is, in most cases, more economical than stock removal from the inside diameter.

The intermeshing sleeves support the punch throughout its entire length. Result?

1. The Punch CANNOT buckle
2. The Punch CANNOT shift off center
3. Perforates thru metal many times thicker than hole diameter.

All Durable Punches are vertically lapped, then electrocoated — Result—easier stripping, no galling, longer punch life.

Because Durable's research department constantly finds answers to difficult piercing problems—thousands of customers DEPEND ON DURABLE.

WHAT'S YOUR PROBLEM?

Whatever your piercing problem may be — DURABLE'S know-how and 18 years experience offers a quick, economical solution. Write today for full details on any piercing problem. You'll get a fast, practical reply from the most DEPENDABLE Punch and Die Manufacturer in the World!

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DURABLE PUNCH & DIE COMPANY
1214 W. Madison Street, Chicago 7, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1351

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Induction Heating Units for heat treating, brazing, soldering, and heating for forming or forging are described in a new bulletin from Lindberg. Technical data on 5, 10, 25, and 50 kw sizes are listed, along with water systems diagrams and a discussion of standard accessory equipment. Bulletin 1441, High Frequency Heating Div'n, Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill.
Circle Inform-A-Gram No. B1.

Favorable Response to the Small Size Die Set Pullers introduced by Durant earlier this year prompted the company to make two additional, slightly larger, sizes of "Shur-Pull" die set pullers. All three sizes are illustrated and described in a circular from Durant Tool & Supply Co., 136 S. Water St., Providence, R. I., or —
Circle Inform-A-Gram No. B2.

Any number of Diameters can be ground with precision accuracy with the Landis 10" and 14" Type H-IW multiple wheel hydraulic grinding machines, described in Catalog P54. A 2-page picture spread in the catalog shows applications. Landis Tool Co., Waynesboro, Pa.
Circle Inform-A-Gram No. B3.

Use Electric Controllers? Buying information for controllers for nearly every application satisfied by manually operated control is contained in Catalog 5509, "Electric Drum, Foot and Limit Switches." Included in the 48-page book is engineering and application data, plus connection diagrams and dimensions. Furnas Electric Co., 1072 McKee St., Batavia, Ill.
Circle Inform-A-Gram No. B4.

A Very Complete Line of Perforating Products is offered in Ring's Punch and Die Catalog No. 104. Round, blank, headless, slug ejector, oblong, square, rectangular, and special punches and dies are shown, along with retainers, counterbores, and quills. Ring Punch & Die Co., Jamestown, N. Y.
Circle Inform-A-Gram No. B5.

A Handbook of Information on Shelby Seamless Steel mechanical tubing is now available to TOOLING and PRODUCTION readers. Its 116-pages contain every important detail about the tubing and its various grades and sizes—from chemical analyses, methods of manufacture, and uses to properties, formulae for calculating weights, and machinability. Get your copy from United States Steel Supply, 208 S. LaSalle St., Chicago 4, or —
Circle Inform-A-Gram No. B6.

Tracer Controlled Milling with Keller machines takes the spotlight in Circular No. 565 from Pratt & Whitney. Keller Type BG-21, patterned after the larger Type BG-22, features three types of control and numerous other construction and operational advantages, as illustrated in the circular. Pratt & Whitney, W. Hartford 1, Conn.
Circle Inform-A-Gram No. B7.

The Oscillation of a Short Brake Tool against a holding-down tool forms and flanges irregularly contoured sheet metal edges which otherwise would have to be formed by hand. Applications for Erco's Model HD former and flanger are unlimited, as shown in Bulletin 158 from Engineering & Research, Inc., Riverdale, Md.
Circle Inform-A-Gram No. B8.

Better surface grinding for you... G BOND users' reports prove it!

Top speed, new economy among many

"TOUCH of GOLD" *advantages listed*

Reports from surface grinding customers on the performance of G Bond wheels sound pretty much alike. That's logical, because each customer is getting exactly the advantages he's looking for — *freer, cooler, faster cutting action . . . heavier cuts without burning . . . closer tolerances and smoother finishes . . . easier dressing and more pieces per dressing . . . more work, and more kinds of work, per wheel.*

Your Own Surface Grinding

will benefit by the G Bond's unique ability to hold each abrasive grain just long enough for maximum cutting action — an important "Touch of Gold" advantage that means time and money saved, plus better product quality, throughout the range of precision and semi-precision grinding jobs.

See Your Norton Distributor

for the G Bond wheels, cylinders and segments you need. They're available in a variety of famous Norton abrasives. Of these, 32 ALUNDUM* abrasive is particularly suited for fast stock removal and heavy feeds — it grinds exceptionally cool and fast, with minimum dressing. And remember: only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

W-1645

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NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
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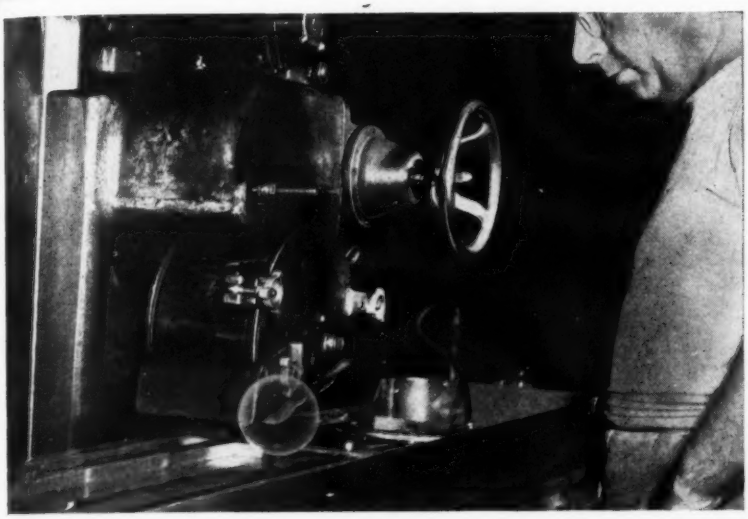
PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

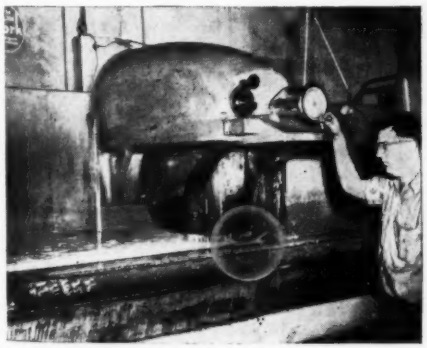
TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Tap Breakage is Practically Forgotten with the Universal hand tapping machine. It permits tapping holes at any point in the work, within the area of the machine table. Get details on driving method, adjustability, and capacity in Bulletin TE4-102 from The Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn.
Circle Inform-A-Gram No. B9.

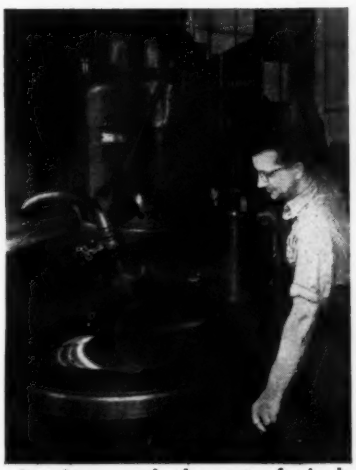
Four Types of Anti-Friction, precision "Red-E" lathe and turret lathe centers are illustrated and described in Bulletin No. L-55: shank type, spindle type, and heavy duty and extra heavy duty bull and pipe types. All necessary specifications and prices are given. Ready Tool Co., 550 Iranistan Ave., Bridgeport 5, Conn.
Circle Inform-A-Gram No. B10.



"Competitive wheels have never equalled G Bond wheels on our jobs." This Massachusetts tool manufacturer further reports G Bond wheels are maximum load production wheels, extremely free cutting, requiring little dressing and giving very long life. His requirements are precision grinding hard steel to a very high finish, and to parallel tolerances of .0001".



"Norton G Bond wheels are faster and freer cutting, need less dressing than any other wheels we've used," says this Pennsylvania metal working company. Material ground is boiler plate and miscellaneous steel plate. Stock removal rate is 4.5 to 6 cubic inches per minute.



Jigs, fixtures and other parts of miscellaneous steels, besides some of cast iron, are the jobs on which G Bond segments are used by this Ohio tool and gage maker. He credits the G Bond segments with giving a better finish, with less dressing, than any he previously used.

CIRCLE INFORM-A-GRAM KEY NO. 1371

Many Inspection Problems can be solved with a simple and accurate snap gage—the "Snappergage." It measures both inside and outside dimensions, groove spacing, recesses, and many hard-to-get-at places. The adjustable gage is described in a bulletin from Ames Instrument Co., Concord, Mass., or —
Circle Inform-A-Gram No. B11.

Air Tools — 65-pages of them — in Buckeye Tools' latest catalog can be used continuously for drilling, fastening, and grinding without danger of over-heating or otherwise damaging the tool mechanisms. Within Catalog G10, you'll find the air tools for all your needs. Get a copy from Buckeye Tools Corp., Dayton 1, Ohio, or —
Circle Inform-A-Gram No. B12.

Feed Bar, Hex, or Tubing Stock to machines with the automatic air-operated stock feed recently developed by Erickson. The unit feeds both rotating and non-rotating mechanisms, with any type collet equipment, as shown in Circular K-2 from Erickson Tool Co., E. 23 and Hamilton Ave., Cleveland 14, Ohio.
Circle Inform-A-Gram No. B13.

The Simplicity of the Design of "E-Z Set" boring and power facing heads means greater strength. Both have the features of 3-position tool block, large micrometer adjusting barrel, and vernier calibration. All sizes of E-Z Set heads, forged boring bits, and boring bars are well-illustrated in a bulletin from The Maxwell Co., 386 Broadway, Bedford, Ohio.
Circle Inform-A-Gram No. B14.

Sulphur-Chlorinated "Cimcut" Base Additive, when blended in various dilutions with mineral oil, can be used for a general purpose cutting oil. The additive's extreme pressure and polar lubricating properties give improved tool life and better finish at higher feeds and speeds. Get detailed information in Publication No. PC-309-1 from Cincinnati Milling Products Div'n, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, or —
Circle Inform-A-Gram No. B15.

Vacuum and Drape Forming Operations done with Auto-Vac plastic forming machines are so completely automatic that all the operator has to do is load the plastic sheets and remove the finished parts. Operating details, construction features, and industrial uses are covered in Bulletin 55 from Auto-Vac Co., 2120 Post Rd., Fairfield, Conn., or —
Circle Inform-A-Gram No. B16.

Precision Measuring Equipment—bore gages, deep hole gages, comparators, and dial test sets— are well illustrated in Reliant's Catalog 55k. Brief descriptions give all the necessary details. Reliant Gage & Supply Co., 4969 Firestone Blvd., South Gate, Calif.
Circle Inform-A-Gram No. B17.

Data Recording, Machine Control, and Process Regulation by magnetic tape recording is a rapidly growing new technique offering great precision and versatility. In machine control, for instance, tape recordings convert blueprints to machined contours. Opportunities and advantages of utilizing magnetic tape recordings are unlimited, as shown in an interesting booklet, D2-1, from Ampex Corp., 934 Redwood City, Calif., or —
Circle Inform-A-Gram No. B18.

Both Friction Clutches and Positive (Pin) clutches are available on the Ferracute standard throat punching presses. Twenty to 105-ton models with non-adjustable beds make up the line described in Catalog P-100 from Ferracute Machine Co., Bridgeton, N. J.
Circle Inform-A-Gram No. B19.

Try these lightweight...speedy

PORTABLE TOOLS

● Produced in the industry's most modern, air-conditioned plant to give you *top precision.*

● Gives you advanced features for *faster production, easier handling.*

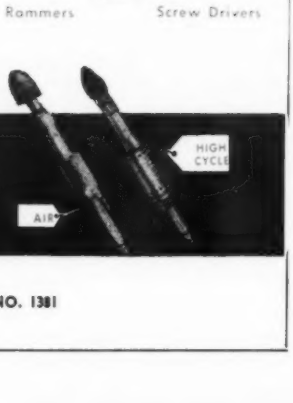
● Backed by Rotor Tool's 25-year reputation for applying the *right tool for your job.*

Ask for a demonstration of any of these tools.

See how they can cut your costs!

Special bulletins on all tools on request.

THE ROTOR TOOL CO.
CLEVELAND OHIO



CIRCLE INFORM-A-GRAM KEY NO. 1381

Standardized Machine Components, including hydraulic drill units, automatic cam feed drilling units, lead screw tapping units, multiple spindle heads, automatic index tables, and machine bases manufactured by Hartford Special are illustrated and described in Bulletin No. 500. Numerous photos show the equipment in use. The Hartford Special Machinery Co., 292 Homestead, Hartford 12, Conn., or —
Circle Inform-A-Gram No. B20.

Instructions for Tube Flaring, squaring, burring and bending are offered along with descriptive details on Parker's Model 232B power tube flarer in a new catalog. Ask for Catalog 1145A12 from The Parker Appliance Co., Tube & Hose Fitting Div'n, 17325 Euclid Ave., Cleveland 12.
Circle Inform-A-Gram No. B21.

A Complete Line of Ball Lock Punches, made of longer wearing alloy tool steel, is introduced in Accurate Bushing's newest folder. The "Lubri-Finished" punches are available with different ball sizes for regular through extra heavy duty services. The folder opens into a chart suitable for use as a wall chart, covering sizes, costs, and competitive equivalents. Accurate Bushings Co., Garwood, N. J., or —
Circle Inform-A-Gram No. B22.

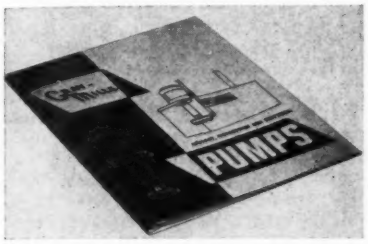
"Atmo-Gen" Units were developed to fill the need for small capacity, high quality atmosphere generators for such operations as bright hardening, dry cyaniding, copper and silver brazing, sintering, and nitriding. Detailed information is available in a bulletin from Hevi Duty Electric Co., Milwaukee 1, Wis., or —
Circle Inform-A-Gram No. B23.

All Models of Cleveland Power-Driven Automatic Index Tables are designed to operate in vertical or horizontal position, or at any angle. This permits their use in operating horizontal indexing drums. The 21" table carries a 400-lb. load, while the 34" table, an 800-lb. load, as shown in a new bulletin from The Cleveland Tapping Machine Co., Canton 6, Ohio.
Circle Inform-A-Gram No. B24.

A Unique New Electrical Control System for Predetermined Repeat or non-repeat cycle on any machine with a mechanical tripping mechanism is described in SCI Bulletin 55-1, published by Security Controls, Inc., Dep't 5F, 255 Franklin St., Buffalo 2, N. Y. The versatile system assures maximum operator safety, simplified machine operation, and increased production. Especially recommended for installation on presses, it is equally adaptable to many other machines.
Circle Inform-A-Gram No. B25.

Accepted as Standard Equipment in many plants, SCI the small Model CS-65 dividing head is used with profiling, drilling, light milling and engraving equipment, and for layout work or anything requiring angular setups and circular or semi-circular divisions. It is a standard universal dividing head with 40-1 ratio crank indexing, as described in a bulletin from Custom Scientific Instruments, Inc., 541 Devon St., Kearny, N. J.
Circle Inform-A-Gram No. B26.

Coolant, Circulating, and Agitating Pumps are the subject of Graymills' latest, very complete catalog. Performance data and illustrated di-



mensional information supplement general descriptive material for the company's lines of pumps. Graymills Corp., 3705 N. Lincoln, Chicago 13. **Circle Inform-A-Gram No. B27.**

The Speed of the Punch Press, immediate availability of a variety of punches and dies in a turret, and quick-setting mechanical work positioning gage combined in the R-61 heavy duty turret punch press make it ideal for piercing flat material in short-run and medium production quantities. The flexible press is described in Bulletin No. 61 from Wiedemann Machine Co., Dep't 163, Box 6794, Philadelphia 32, Pa.
Circle Inform-A-Gram No. B28.

The Expense That Results From Mis-Aligned Bed-Ways is discussed in the new "King-Way" Alignment Instrument brochure. It tells how the instrument may be used in preventative maintenance and machine rebuilding, how it operates, and how it is applied. King Instrument Co., Dep't KP, 804 Northwestern Bank Bldg., Minneapolis 2, Minn., or —
Circle Inform-A-Gram No. B29.

The Upright Construction of the Spindle and Stationary Chuck on Wicaro's Continuous Oil Groover permits the operator to load and unload bearings without stopping the machine. This saves time and reduces unit cost. All sizes and types of bearings can be accommodated on the machine, producing both internal and external oil grooves in the bearings. The Wicaro Machine Corp., 4801 Stenton Ave., Philadelphia 44, Pa., will send complete details.
Circle Inform-A-Gram No. B30.

"Magimmick" Magnetic Retrieving Tools pick up elusive nuts, bolts pins, washers, etc. from any angle. The useful retrieving tool, plus ball-joint inspection mirrors and magnifiers and ratchet-type piston ring compressors, is shown in a bulletin from Ullman Products Corp., 15 River St., Norwalk, Conn.
Circle Inform-A-Gram No. B31.

Utilizing Minimum Aisle Space and providing perfect load maneuverability, Trak-Rak cranes, top running or under-running cranes with vertical rotating column, and incorporating the features of a fork truck, are used for all types of materials handling jobs—from auto bodies to small parts. See how they're used in Trak-Rak bulletin TRC-101 from Chicago Tramrail Corp., 1330 S. Kostner Ave., Chicago 23, Ill.
Circle Inform-A-Gram No. B32.

Low - Sludging - High Detergency Sun Quenching Oil Light can be used in any type of quenching oil system. Bulletin No. 37 from Sun Oil Co., Philadelphia 3, Pa., describes its properties and also includes a table showing the advantages of various degrees of oil agitation.
Circle Inform-A-Gram No. B33.

EACH MACHINIST BECOMES A 5346

ONE MAN CREW

WITH PORTELVATOR®

THE HANDY HAMILTON PORTABLE ELEVATING TABLE

One man can lift, lower, and transport compact, heavy loads which, without Portelvator, would require the combined strength of three or more men.

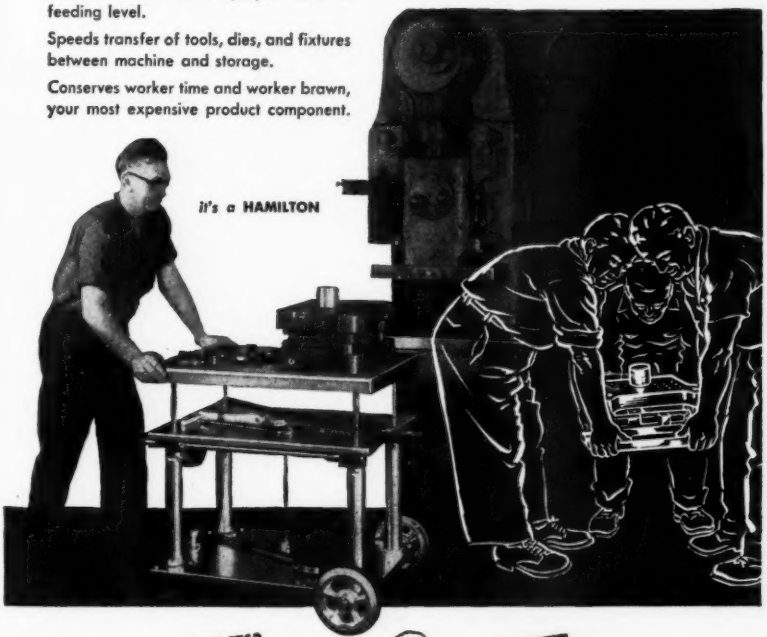
Maintains materials at proper machine feeding level.

Speeds transfer of tools, dies, and fixtures between machine and storage.

Conserves worker time and worker brawn, your most expensive product component.

Reduces injuries to workmen, and damage to tools and materials due to manual handling.

Provides a portable work bench when and where required.



WANT MORE FACTS?
Write for FREE Hamilton Bulletin No. 5346.
Address The Hamilton Tool Company,
832 South Ninth Street, Hamilton, Ohio

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1391

"Protectron" Constantly Measures the Load within a machine and "trips" when the load increases above a preset value of mechanical overload. It saves tools and dies on presses, dieing machines, and eyelet machines, especially. Details are in Bulletin 70-105 from Sperry Products, Inc., Danbury, Conn.
Circle Inform-A-Gram No. B34.

Geartronics—as an organization—stands ready to assist you in the solution of gearing problems, starting from basic research, through the development of a new product or the experimental work required to improve existing products, and the design and construction of the prototype model to prove the results. This is outlined in an illustrated brochure from Geartronics, W. Concord, Mass.
Circle Inform-A-Gram No. B35.

"The Story of Federal Short Run Stampings" features the facilities, personnel, and experience massed at Federal Tool & Mfg. Co. for producing close tolerance, quality short run stampings. The illustrated 12-page booklet is available from Federal, 3600 Alabama Ave., Minneapolis 16, Minn.
Circle Inform-A-Gram No. B36.

Automation

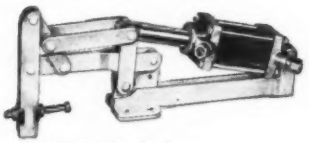
AND LAPEER AIR-OPERATED CLAMPS

Here are pictured just two Lapeer AIR-OPERATED Clamps—of many models available to assist in achieving AUTOMATION in your plant!

There are models for 200 lbs. . . . 400 lbs. . . . and 1200 lbs. clamping force!

And if it's HEAVY-DUTY type you need, we have those too!

MODEL AODT-400



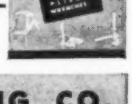
Double-toggle clamp to clamp "around the corner"

MODEL AO-400

Toggle Clamp for conventional clamping.. Superimposed line drawing illustrates the AODT-400 for such difficult mounting situations as when the cylinder interferes with conventional clamping. 4710

See all of these at our EXHIBIT 510, PRODUCTION ENGINEERING SHOW at Chicago in September . . . and at our BOOTH #706, METAL SHOW at Philadelphia in October.

SEND FOR OUR CATALOG NOW!



Manufacturers of a complete line of Stationary and Portable Clamps and Pliers

KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.

3064 DAVISON ROAD LAPEER, MICHIGAN

WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ont.

CIRCLE INFORM-A-GRAM KEY NO. 1401

New Stub Tap Standards developed by the National Screw Machine Products Association, plus details on its own stub taps manufactured according to these standards, are features of a new folder from Besley-Welles. The shorter-length stub taps fit screw machines without alteration. Besly-Welles Corp., 100 Dearborn Ave., Beloit, Wis., or —
Circle Inform-A-Gram No. B37.

Forty-Eight Thread and Feed Changes are available on the new Model LE "Tray Top" engine lathes described in a brochure from Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio. The all-geared head lathes have 12 spindle speeds and are available in 10", 12½" 15", and 18" sizes for manufacturing, tool room, and maintenance use.
Circle Inform-A-Gram No. B38.

Milling Cutters, Arbors, Adaptors, and Collets — pages and pages of them—are completely described in Brown & Sharpe's Catalog No. 36C. Useful information on types of cutters, their care, and use supplements dimensional data. Brown & Sharpe Mfg. Co., Providence 1, R. I.
Circle Inform-A-Gram No. B39.

The Large Knurled Feed Ring on Chandler-Duplex combined boring and facing toolheads is graduated to read in 0.0001" for sensitive adjustments. With them, it is possible to do boring, facing, turning, grooving, and undercutting operations in one setup, as shown in a bulletin (Form CT55) from Chandler Tool Co., Muncie, Ind.
Circle Inform-A-Gram No. B40.

For Any Job Requiring Rotary Force Settings Over 200-ft. lbs., Bonney Forge's "X-4" 4-to-1 geared head wrench answers your call. The small, light weight planetary-geared wrench generates high torque within limited space, as illustrated in a descriptive bulletin from Bonney Forge & Tool Works, Allentown, Pa. **Circle Inform-A-Gram No. B41.**

Hints on Dressing and Truing grinding wheels are presented along with technical data on dressers and cutters in Desmond's Dresser Catalog No. 75. Each type wheel dresser manufactured by Desmond-Stephen is illustrated, with features explained, in the 24-page catalog. Desmond-Stephen Mfg. Co., Urbana, Ohio.
Circle Inform-A-Gram No. B42.

While Separating Condensed Water and Oil from the compressed air, self-contained "DriAir" separators collect rust, scale, and sediment from the pipe lines and deliver clean, dry air to tools and other pneumatic equipment. Get operational and application details in Bulletin D-A from New Jersey Meter Co., Plainfield, N. J., or — **Circle No. B43.**

The 40,000-Plus Hydraulic and Pneumatic Control Valves manufactured by Versa Products are now described in one catalog for easy reference. Six sizes of "Versa Valves", from ⅛ to 1-NPT, are illustrated with the more frequently needed actuating devices. Ask for Folder No. 15 from Versa Products Co., Inc., Box 33, 249 Scholes St., Brooklyn, N. Y., or —
Circle Inform-A-Gram No. B44.

Stepless Form Turning, contour facing, and step shafts are all in the day's work for the LeBlond Hydra-Trace. Templates are flat and can be made easily in your own plant. All the details on the Hydra-Trace hydraulic tracer attachment for heavy duty lathes are in a bulletin from The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.
Circle Inform-A-Gram No. B45.

High-Strength, Vibration-Proof Joints are often required in the assembly of large structures. Townsend's new Commercial Lockbolt is pulled, by means of a special pneumatic gun, through the pieces to be joined. The action spin-swages a collar tightly around a series of locking grooves on the stem of the bolt, clamping it tightly against the sections being joined. Complete details are in a new bulletin from Townsend Co., New Brighton, Pa.
Circle Inform-A-Gram No. B46.

It's Now Possible and Practical to do heavy duty milling and grinding on magnetic chucks, according to Sundstrand's Bulletin 554-M. Numerous operational possibilities for the low voltage chucks are revealed, along with technical specifications. Sundstrand Magnetic Chuck Products Co., 1020 Ninth St., Rockford, Ill., or —
Circle Inform-A-Gram No. B47.

Shrink-Fit Assembly of Metal Parts, metal treatment through chilling, gas-dehydration, and metal and material testing are a few of the many industrial operations performed by chilling equipment and test chambers described in the new 12-page catalog from Cincinnati Sub-Zero Products, Reading Rd. at Paddock, Cincinnati 29, Ohio. Seven chilling models and four industrial temperature testing models are illustrated.
Circle Inform-A-Gram No. B48.

The "Controllarc" DC Welder automatically and continuously adjusts the selected arc characteristics to every change in welding condition, from strike to end of pass. Construction and operation features, performance charts, specifications, and ratings for the magnetic amplifier DC welder are in a new bulletin from Vickers Electric Div'n, 1815 Locust St., St. Louis 3, Mo., or —
Circle Inform-A-Gram No. B49.

For Top Power from Air Power, the new Aro "Hi-Lo" speed couplers and connectors offer efficiency, leak-proof seal, interchangeability with other brands, high air volume and low pressure drop, and many other features. Sizes from ¼" to ½" are illustrated in a bulletin from The Aro Equipment Corp., Bryan, Ohio.
Circle Inform-A-Gram No. B50.

Learn About "Generating Functional Cylindrical Surfaces" so machined parts efficiently perform their intended functions, in Vol. 7, No. 1 of "Cross Hatch." Examples of hydraulic valves, aircraft parts, bearings, and cylinders prove the need for and show the achievement of functional surfaces, in the booklet. Micromatic Hone Corp., Detroit 38, Mich., or —
Circle No. B51.

Some of the Uses and Adaptations of the semi-automatic "Kam-Grip" jigs and fixtures are shown in a new 4-page brochure from Manufacturers Engineering Service. They are used for single operations or high production holding operations. Manufacturers Engineering Service, Inc., Toledo 4, Ohio.
Circle Inform-A-Gram No. B52.

5203-B

IT'S A HAMILTON

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE IS SUCH A TOOL!

WANT ALL THE FACTS ?

Write for Hamilton Bulletin No. 5203. Address The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio.

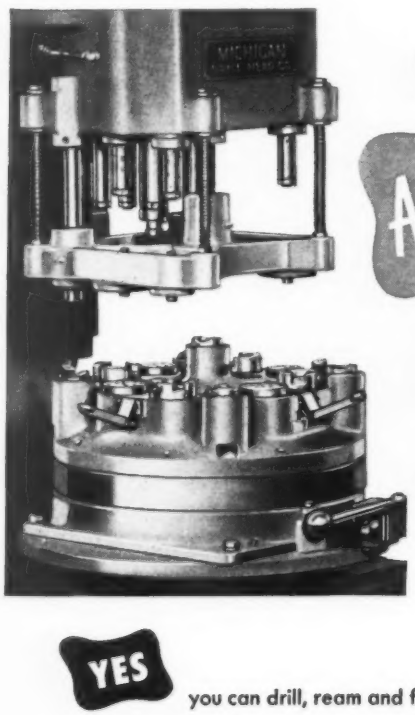
IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1411

Simply Change Inserts to adapt the "Equa-Grip" basic holding fixture and vise to milling, drilling, tapping, grinding, reaming, and countless other operations. Uses are illustrated in Brochure EG55, along with dimensions. Holt Products Co., Holt, Mich.
Circle Inform-A-Gram No. B53.

The Fine Jet Mixture of air and coolant applied directly to parts and tools with "Jetcool" units makes it possible to increase feeds and speeds by keeping tool and parts from over heating, and leads to a 75% savings in coolant. Applications of atomized coolant mixtures with Jetcool units are described in literature from Paasche Airbrush Co., 1909 Diversey Pkwy., Chicago 14, Ill.
Circle Inform-A-Gram No. B54.

Control Disturbances transmitted from rotating, reciprocating, and impact-producing machinery by installing the machinery on "Elasto-Rib" dampers. No need to bolt the machines to the floor when these rubber and cork dampers are used. Their applications are discussed in a bulletin from Korfund Co., Inc., 48-15 32 Pl., Long Island City, 1. N. Y.
Circle Inform-A-Gram No. B55.



You can do AMAZING THINGS on a small drill press

YES you can drill, ream and finish bore pressure plates for hydraulic pumps, on the drill press pictured above.

Here's a nine spindle drill head bushing plate and fixture and, a four-station hand operated index table—mounted on a Michigan Hydro 3 Drill Press. It's really amazing!

We also invite your inquiries as to our line of tapping units, and index tables—both manual and automatic—catalog sent on request.

Michigan DRILL HEAD CO. Detroit 34, Michigan
engineers and manufacturers of production machines and drilling equipment

CIRCLE INFORM-A-GRAM KEY NO. 1421

Wherever Accidental Shaft Misalignments, load shocks, and vibrations are possible, use "Flexpin" couplings because they allow up to ½" for endwise displacement of the connected shafts. The laminated steel pin couplings are flexible in all directions, as shown in Bulletin 53 from Smith & Serrell, Inc., 200 Washington St., Newark, N. J.
Circle Inform-A-Gram No. B56.

If You Use Motor Controls, you can't afford to be without the Sixth Edition of Allen-Bradley's Handy Catalog. Its 120-pages are filled with detailed information on all types and sizes of electric motor controls, from dc apparatus, drum switches, and rheostats to magnetic starters, limit switches, and synchronus starters. Allen-Bradley Co., Milwaukee 4, Wis.
Circle Inform-A-Gram No. B57.

Such Divergent Materials as aluminum magnesium alloys, low carbon and austentic steels and nickel alloys can each be welded with just a simple change of the control settings on a 3-phase "Modu-Wave" spot welder. This Sciaky welder, subject of Bulletin 343-3, satisfies military and aircraft specifications. Sciaky Bros., Inc., Dep't L-2, 4915 W. 67 St., Chicago. **Inform-A-Gram No. B58.**

Two Additions to the "Shear-Speed" Gear Shaper line, Models 8136 and 18206, for high speed production of large gears and toothed parts, are described in Bulletin SS-55. It gives an informative picture of their features and advantages plus dimensional and operational specifications. Get your copy directly from Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., or —
Circle Inform-A-Gram No. B59.

Among the Tooling Items Described in the new brochure from Pioneer Tool Engineering are the new "Octopus Grip" vacuum chuck, a complete line of Hetzel pumps, two new tooling materials (a cast aluminum and a cast zinc), cast aluminum heating platens, lay-up molds, and their complete tool engineering service. Pioneer Tool Engineering, Inc., 1601 E. El Segundo Blvd., El Segundo, Calif.
Circle Inform-A-Gram No. B88.

"Water-Mix Cutting and Grinding Fluids" discusses factors that enter into the proper selection and application of water mixtures in machining. Topics covered in the booklet include the chemistry, selection, and application of modern soluble oils; performance considerations; and handling suggestions. Get a copy from D. A. Stuart Oil Co., 2727 S. Troy St., Chicago 23, Ill., or —
Circle Inform-A-Gram No. B60.

A Side-by-Side Comparison of Four hydraulic tubing specifications —SAE JIC, AMS 5050 E, and ASTM-A 179 — is a feature of Superior Tube's new "SAE Hydraulic Quality Steel Tubing" booklet. Advantages, uses (many of them new), and working data for its hydraulic low carbon steel tubing are in the bulletin (No. 39) from Superior Tube Co., 1733 Germantown Ave., Norristown, Pa., or —
Circle Inform-A-Gram No. B61.

Close Quality Control can be maintained on such characteristics as composition, heat treatment, hardness, and case depth of metal parts by comparing them with a standard part on Sunshine's Metals Comparator. The "how, when, and why" of the nondestructive tester are found in Catalog 27 from Sunshine Scientific Instrument, 1810 Grant Ave., Philadelphia 15, or —
Circle Inform-A-Gram No. B62.

Increase the Flexibility of horizontal boring, drilling, and milling machines by installing rotary tables. They simplify and reduce the number of work settings and provide rapid and accurate work indexing. Combination, plain, hand, and power feed tables are shown in Bulletin A-20 from Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.
Circle Inform-A-Gram No. B63.

Only the Load Strokes of presses, shears, cut-off machines, etc. are counted by Control Devices' new electronic load counter. The unit also counts cycles applied to a specimen before failure on fatigue or cyclic testing machines. Bulletin L-2 from Control Devices, Inc., 8299 E. 9-Mile Rd., Van Dyke, Mich., gives detailed information on the load counter.
Circle Inform-A-Gram No. B64.

Design of the Piston-Type Hydraulic Oil Accumulators made by Parker makes them highly suitable for storing energy, absorbing shock, and supplementing pump capacity in hydraulic systems on a wide variety of industrial equipment, as you'll see in Catalog 1536. Brand-new precharging accessories are also described. Industrial Hydraulics Div'n, Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio, or —
Circle Inform-A-Gram No. B65.

For Precision Tolerance Boring on a production basis, the New Britain Model 50 boring machine offers a double-end tool or work rotating unit specifically designed for products requiring exacting accuracy at high production rates. Features and specifications are outlined in a bulletin from The New Britain Machine Co., New Britain-Gridley, Machine Div'n, New Britain, Conn., or —
Circle Inform-A-Gram No. B66.

The Locking Action of the one-piece, all metal, reusable "Flexlock" lock nuts is illustrated in Form 886. They can be used either as locknuts or stop nuts and are unaffected by temperatures up to 550°F. Applications are unlimited, as the bulletin shows. Standard Pressed Steel Co., Box 600, Jenkintown, Pa.
Circle Inform-A-Gram No. B67.

Shop Surface Roughness Measuring equipment in the new Profilometer equipment catalog (No. 155) includes the portable Amplimeter, tracers for manual and mechanical operation, and motor-driven piloting equipment for straight-line, short-stroke, and circular tracing. An introductory section in the booklet shows equipment combinations most commonly used. Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., or —
Circle Inform-A-Gram No. B68.

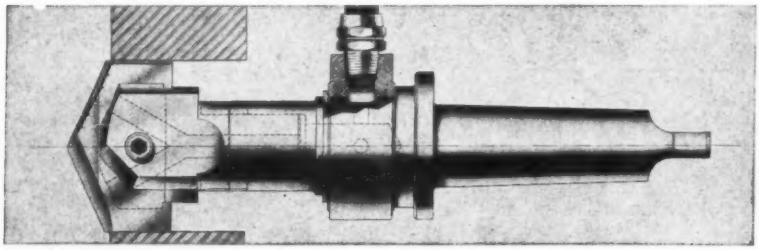
The Six Series of Heat Treating Furnaces illustrated in Lucifer's latest bulletin come in a wide range of sizes and with various features, to suit all types of heat treating requirements. Get the bulletin from Lucifer Furnaces, Inc., Neshaminy, Pa., or — **Inform-A-Gram No. B69.**

PRECISION GEARS
YOU who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production.
YOU who use small, fine pitch, precision gears can increase your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.
The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.
WANT FACTS?
Write for Bulletin No. 5419.
Address The Hamilton Tool Company
832 South Ninth Street,
Hamilton, Ohio.
IT'S A
Hamilton Tool
USE IT WITH CONFIDENCE
CIRCLE INFORM-A-GRAM KEY NO. 1431

A 125-hp Electric-Driven "Packaged" Air Compressor has been added to Ingersoll-Rand's line of air-cooled two-stage Type 40 stationary compressors. It is light weight and can be moved from job to job easily. Features and dimensions are pictured in Form 3188 from Ingersoll-Rand, 11 Broadway, N. Y. 4.
Circle Inform-A-Gram No. B70.

"Vari-Pitch" Sheaves utilize pitch diameter adjustments to provide quick, exact speed variations for applications where speed changes are infrequent and the machine can be stopped for the change, or where frequent speed changes must be made while the sheaves are moving. They handle capacities to 600-hp, as you'll see in Bulletin 20B6082C from Allis-Chalmers Mfg. Co., 1013 S. 70 St., Milwaukee, Wis.
Circle Inform-A-Gram No. B71.

Mold Your Own lead hammers with the molds shown in Cook's lead hammer service brochure. Ready-made, "Shur-Grip" hammers are shown also, as are Cook's dropped forged steel handles. Lawrence H. Cook, Inc., 65 Massasoit Ave., E. Providence 14, R. I.
Circle Inform-A-Gram No. B72.

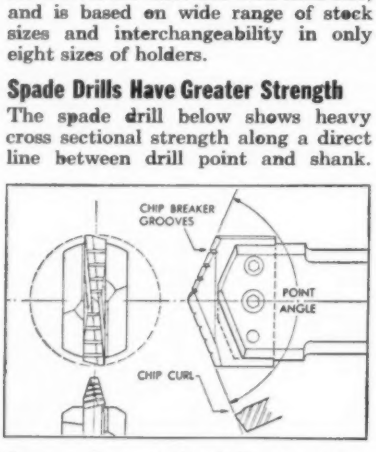


Reduce Costs with Gairing Spade Drills

For drilling large holes and holes in hard and tough materials, Gairing Conner-Type Spade Drills, in stock sizes from 1 to 5-inch diameter, offer many advantages. *They drill from the solid,* and keep on drilling without being retracted to clear them of chips. Their *performance* is based on the great strength of the assembled drills, and on the design of the drill point. Their *economical use* increases with their size, and is based on wide range of stock sizes and interchangeability in only eight sizes of holders.

Spade Drills Have Greater Strength

The spade drill below shows heavy cross sectional strength along a direct line between drill point and shank.



Compared to a twist drill, this design provides great resistance to *end thrust* (for better drilling from the solid), to *torque* (to lessen chipping and breaking through vibration), and to *bending.*

Drill Point Designed for Hard Work

Spade drill cutters are furnished finished ground with these features: *small dead center* minimizes end thrust, *cutting angles* (point angle and rake) provide better support of cutting edges, *chip breaker grooves* keep chips narrow, *chip curls,* ground parallel to cutting edges, break chips short.

A Rugged Tool for General Work

A rugged tool for all large hole drilling in tool rooms and tool and die shops and for shallow production drilling, where coolant can be applied in the conventional way, is shown at the left.

A Tool for Continuous Production

Oil hole drills, rotating or designed for the turret lathe, flush chips from the bottom of deeper holes on production work. Many such drills, like the one shown above with a special oil inductor holder, are made larger than standard for special applications.

Full data on standard drills and examples of deep hole drilling are shown in our Spade Drill Catalog. Write us, or call our representative.

THE GAIRING TOOL COMPANY
Tooling—Standard and Special
21227 Hoover Road
DETROIT 32, MICHIGAN

COUNTERBORES · E-CON-O-MILLS · BORING BLOCKS & BARS · FINE TOOTH CUTTERS · SPADE DRILLS · SPECIAL TOOLS · CHIP-HOG TURNING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1441

Apply Square Gage Block Accuracy to a wide variety of precision measuring and scribing operations with the basic accessories for gage blocks illustrated in Dearborn Gage's newest brochure. Special gages such as snap, height, and plug gages, calipers, etc. are assembled with them. Ellstrom Standards Div'n, Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.
Circle Inform-A-Gram No. B73.

More Compact, Finned Housings and higher gearing efficiency are two of the improvements found in Boston Gear's new 100 Series of reductors and ratiomotors for power transmission. The whole series is completely described and illustrated in 208-page pocket-size Catalog R-56 from Boston Gear Works, Quincy 71, Mass. **Inform-A-Gram No. B74.**

The Complete Line of Stainless Steel Jig and Fixture components for instrument tooling, including the complete specifications and drawings of each unit, is presented in a catalog from Von Industries, Inc., 192 Hillside Ave., Williston Park, N. Y.
Circle Inform-A-Gram No. B75.

A New Construction Principle is advanced with the development of "Cycleweld" adhesives. They're especially valuable for thin metal laminate and adhere well to rubber, wood, ceramics, thermosetting plastics, and fibrous materials. Get details in a bulletin from Cycleweld Products Div', Chrysler Corp., 5437 W. Jefferson Ave., Trenton, Mich., or **Circle Inform-A-Gram No. B76.**

A New Testing Stand, the "Magnicator," with a permanent magnet base for dial indicators, is comprehensively illustrated and explained in leaflet M16, from Brown & Sharpe Mfg. Co., Providence 1, R. H.
Circle Inform-A-Gram No. B77.

The Big Feature that Assures Vibrationless operation of the 1224 Hydrabrasive surface grinder is its hydraulic drive. Its table is moved by two rams, giving constant speed in each direction and reducing drive mechanism space. Work surface is 12" by 24". Get grinder details in a bulletin from Abrasive Machine Tool Co., E. Providence 14, R. I., or **Circle Inform-A-Gram No. B78.**

Every Important Element of the new 16" sliding head bench, floor, and multiple spindle drilling machines made by Cincinnati Lathe & Tool is built-in and conveniently located. They are ready to operate as soon as power leads are connected to the factory-installed electrical controls built into the heads. Get details in Catalog D-138, The Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio. **Circle Inform-A-Gram No. B79.**

Gear Designers, Users, and Buyers will find the Philadelphia Gear Manual's 76-pages of illustrations, diagrams, definitions, tables, charts, and explanations regarding all types of gears, is invaluable. For the first time, a simplified method of calculating horsepower ratings of all types of gearing is presented. Ask for Gear Catalog G-655, Philadelphia Gear Works, Inc., Philadelphia 34, Pa., or —
Circle Inform-A-Gram No. B80.

The Latest Needle Bearing catalog published by Torrington is organized and coded to speed bearing selection. Design, application, and use data

for five types of needle bearings is conveniently, yet completely, presented in the big 76-page book. Get a copy from The Torrington Co., Torrington, Conn.
Circle Inform-A-Gram No. B81.

Get Close Temperature Control with effective pyrometer supplies. Richards' temperature control components — thermocouples, protecting tubes, thermocouple wires, insulators, pyrometers, and accessories — are completely described and illustrated in a brochure. Get a copy from Arkley S. Richards Co., Inc., Newton Highlands 61, Mass., or—**Circle Inform-A-Gram No. B82.**

"Tumico" Optic Vernier Height Gage in 18" to 84" sizes are discussed in a pamphlet from Tubular Micrometer Co., St. James, Minn. It also notes the advantages, specifications, and construction of the machine.
Circle Inform-A-Gram No. B83.

The New Metallizing Material — sprayed molybdenum "Sprabond Wire" — offers a wide range of practical applications in bonding and building-up metal surfaces. General characteristics and numerous illustrated application records are stated in Bulletin 57 from Metallizing Engineering Co., Inc., 1101 Prospect Ave., Westbury, L. I., N. Y.
Circle Inform-A-Gram No. B84.

The Metallurgy of the New Titanium Alloy, MST 6A1-4V, is explained in a bulletin from Mallory-Sharon. It includes the properties and recommended heat treatment, forging, and welding procedures, as well as chemical data. Get your copies from Mallory-Sharon Titanium Corp., Niles, O.
Circle Inform-A-Gram No.B85.

The Selection of the Proper Die Head for threading jobs is explained in Bulletin No. 32, available from The Eastern Machine Screw Corp., New Haven, Conn. The company's General Purpose head uses H&G hobbed or tapped chasers and the Insert Chaser type, small, highly efficient Insert chasers for threading various materials. The folder describes the heads and lists recommendations and applications for their use. **Inform-A-Gram No. B86.**

Fifty Models of Famco Power Presses are featured in a new catalog. In addition to the latest information and improvements, it gives complete specifications for each, die space dimensions, and information on figuring press tonnage requirements. Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis.
Circle Inform-A-Gram No. B87.

New SEIBERT TAP DRIVERS

PERMIT FASTER AND EASIER TOOL CHANGES IN CLOSE-CENTERS

★ Seibert now offers a new, improved adjustable Tap Driver, available in both Tension or Compression types, that is easier to work with in close-center jobs and provides added strength and rigidity to the nose of the float. With the new Seibert one-piece holder, taps are now held securely and accurately in place by a trepan clamp. This design feature permits faster and easier change of taps and eliminates the hex nut method of holding which is difficult to work with in close-center work and which, on occasion, will twist off the nose of the float if turned too tight. Elimination of the hex nut also permits greater clearance for tapping in counterbored holes.

PRECISION-BUILT TO MAINTAIN CLOSE TOLERANCES

Like all Seibert Production Holding Tools, these new Tap Drivers are precision-built from highest quality alloy steel, hardened and ground for perfect fit. Diameters are held to .0003", and total concentricity 6" from the nose is held to within .002" (total indicator reading).

ADDITIONAL DATA

Write today for Folio 2-50 illustrating and describing the complete line of Seibert Adapters and Tap Drivers.

View of new trepan method of holding that is easier to work with and provides greater clearance in close-center jobs.

Shur-Lock Adapter Bodies

Shur-Lock Micro-Nuts

Spindle Extension Assemblies—800 Series

Spindle Extension Assemblies—900 Series

SEIBERT

SEIBERT & SON, INC. CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1451

FIGHT HIGH PRODUCTION COSTS! ECONOMIZE with OLIVER DIE MAKING MACHINES

High and unnecessary die making costs will be eliminated . . . production schedules and higher product standards maintained . . . when you equip your toolroom with OLIVER DIE MAKING MACHINES. With an Oliver in your service, smoother production will be assured . . . higher output certain . . . lower die making costs a fact!

OLIVER DIE MAKERS are ECONOMICAL . . . they save you time . . . are easy to operate . . . do not require skilled labor. Many plants have been using Olivers for more than 30 years because they produce dies with more economical results.

OLIVER DIE MAKERS are EFFICIENT . . . prove themselves every day in more than 10,000 installations around the world by consistently effecting cost reductions of as much as 60% through simplifying sawing, filing and lapping operations.

OLIVER DIE MAKERS are ACCURATE . . . engineered, designed and built by Oliver of Adrian, the precision-made Olivers have been tried and tested for four decades. Unsurpassed for accuracy on Dies, Production Filing, Experimental work, Metal Patterns, Cams, Gages and Templates, OLIVER DIE MAKERS are considered essential wherever precision work is constantly required.

OLIVER DIE MAKERS
Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS

See our catalog in Sweet's Directory

MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

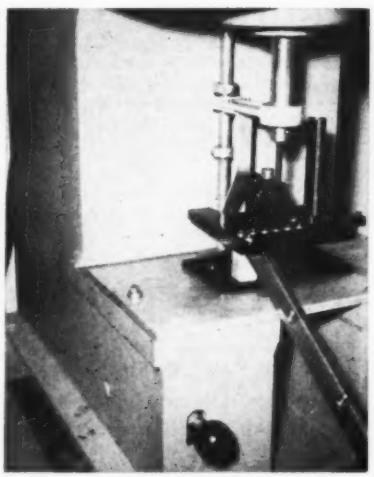
OLIVER INSTRUMENT CO.
1436 E. MAUMEE . ADRIAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1461

Ballizing Bore of Steel Washers

Equipped with rotary index work tables ranging in size from 14" to 60" in diameter, Acme presses, built by the Acme Press Division, Acme Broach Corporation, Milan, Michigan, can be automated with workhandling arrangements to meet many requirements, including the elimination of manual handling of parts.

A recent tool-up of an Acme 7" stroke hydraulic bench press provided for ballizing the bore of steel washers. In this setup, parts are automatically fed from the tube, shown at the right of the fixture, to a station located under a push rod actuated by the press ram. The central portion of the fixture contains a recirculating arrangement containing carbide sizing balls which are automatically fed into position one at a time as required.



In the operation of this setup, a workpiece dwells at the station under the push rod. A carbide ball drops into place and is forced through the bore of the part by the push rod, thus sizing and finishing the bore. The part is then automatically ejected and slides down the discharge chute.

As the carbide ball is pushed through the bore of the part, it drops into the magazine of the recirculator for re-use in its turn.

Production on this ballizing operation is approximately 1400 pcs/hr.

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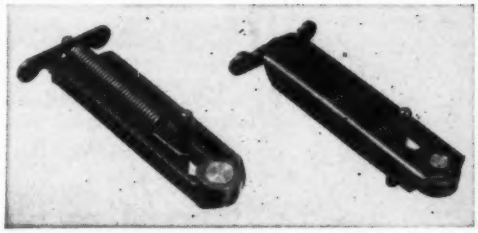

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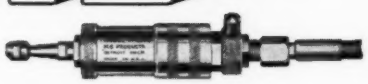

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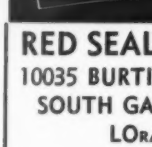

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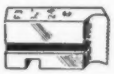

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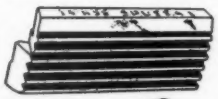

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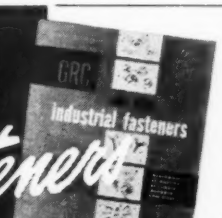

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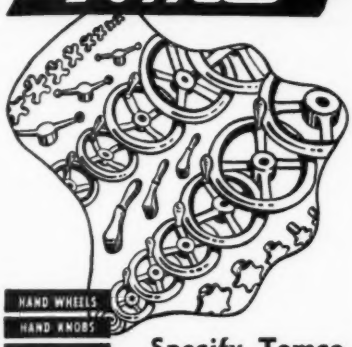

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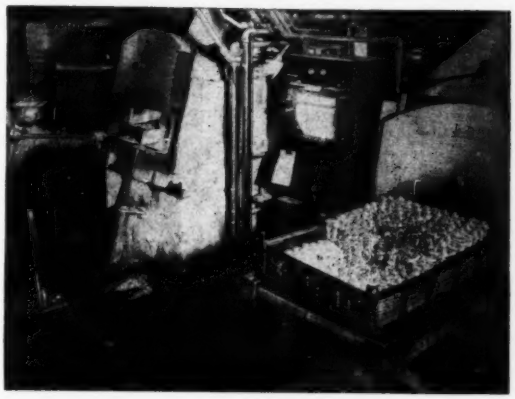

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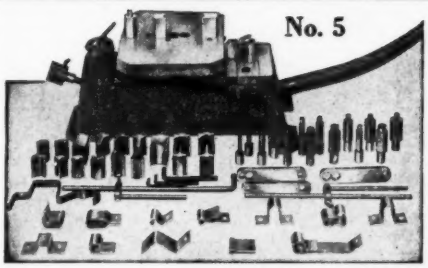

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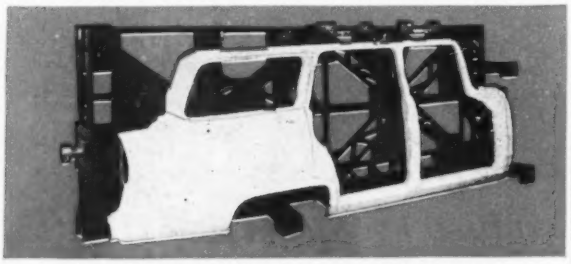

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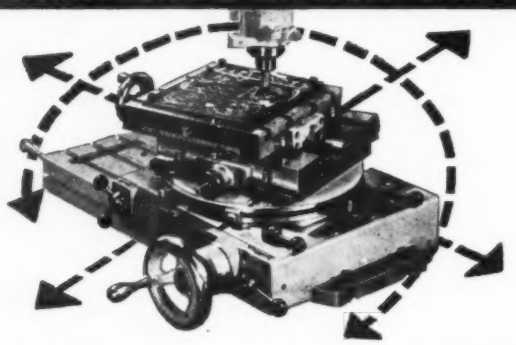

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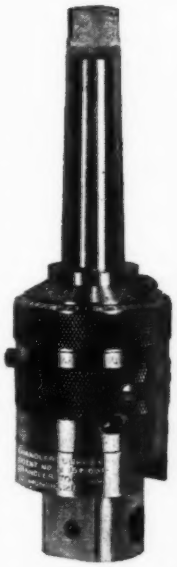

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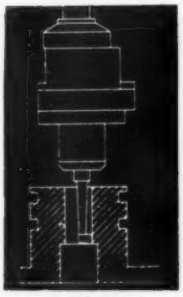
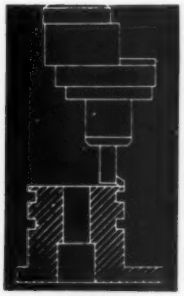
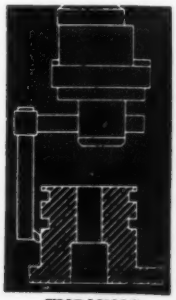


BORING



FACING



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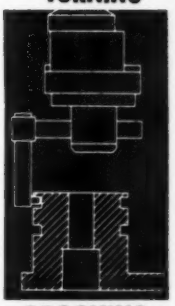
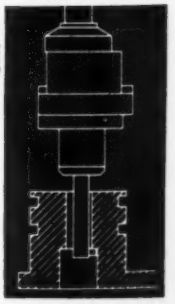


GROOVING



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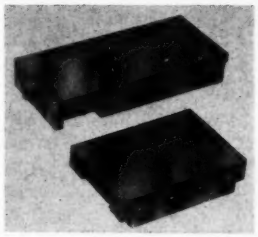

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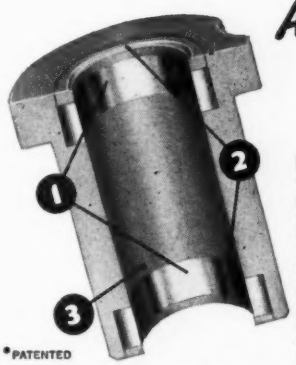

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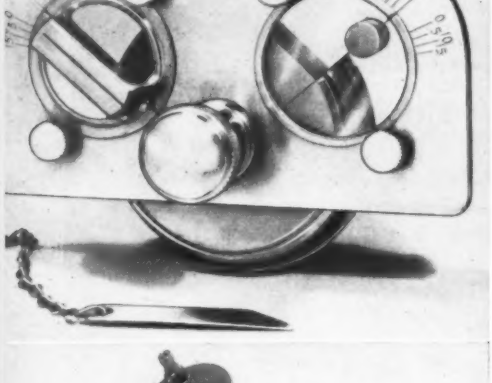
NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS

POSITIONS WORK . . .

This Midget PowRarm work positioner rotates work such as electronic tubes, relays and controls, instruments, etc. freely in three planes and locks in position merely by moving the control lever. Thus, the workpiece is always held at the most convenient angle or approach for each operation. Wilton Tool Mfg. Co., Inc., 9525 Irving Park Rd., Schiller Park, Ill., or — **Circle No. A1.**



SCRIBE 'N CHECK . . .

Check and sharpen circular form tools used on automatic screw machines with this high precision "Scribe-Chek" cutting edge gage. It permits scribing the exact cutting edge required on the tool (with or without top rake) and visual checking of the results. It is simple to use and a product of The Somma Tool Co., Waterbury, Conn. **Circle No. A2.**

TOOLMAKERS' SCOPE . .

An unusual feature of the economical new Scherr toolmakers' microscope is the possibility of interchanging oculars quickly. The measuring stage has a range of 1½" x 2" with 1" micrometer drums reading in 0.0001". Optics for the microscope are by E. Leitz, Germany. George Scherr Optical Tools, Inc., New York 12, N. Y., or — **Circle No. A3.**

POWER SAW . . .

The new "Speedy-Cut" power sawing machine (Model 3-S6) features a new mechanical gear arrangement, resulting in 3 cutting speeds for a wider range of utility in both toolroom and production use. The Peerless Machine Co., 1600 Junction Ave., Racine, Wis. **Circle No. A4.**

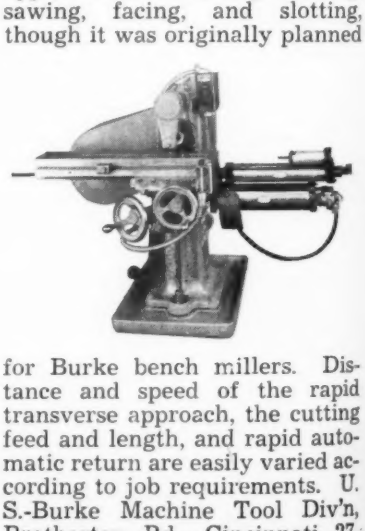
MOTION ANALYZER . .

Velocities, accelerations, deflections, and stresses can be determined from photographed information right at the engineer's desk with Vanguard's new mo-

tion analyzer. The unit utilizes a projector to measure linear motion versus time interval for events recorded on film. Vanguard Instrument Corp., 184 Casper St., Valley Stream, N. Y., or **Circle Inform-A-Gram No. A5.**

TABLE FEED . . .

For controlled, high speed production of small parts, an air-operated hydraulically-controlled table feed has been developed by U. S.-Burke. It is adaptable to an extremely wide range of applications including milling, sawing, facing, and slotting, though it was originally planned



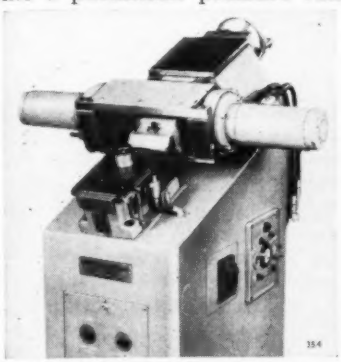
for Burke bench millers. Distance and speed of the rapid transverse approach, the cutting feed and length, and rapid automatic return are easily varied according to job requirements. U. S.-Burke Machine Tool Div'n, Brotherton Rd., Cincinnati 27, Ohio. **Inform-A-Gram No. A6.**

ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

NEW MARKER . . .

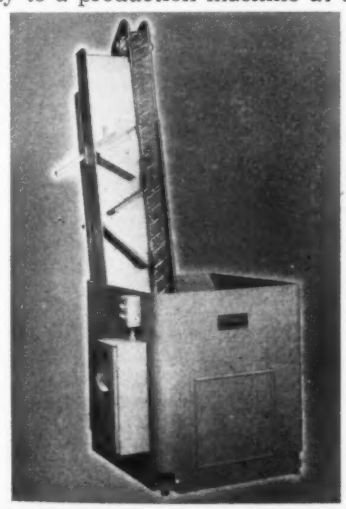
Newly-introduced Series 46 Noblewest marking machines differ from conventional marking machines in that they combine a pneumatic pressure ram



for depth of mark and a pneumatic die slide for roll marking round and flat surfaces, in one unit. They can be operated either completely or semi-automatically. The "Twin-Ram" head can be mounted horizontally, vertically, or at an angle (as shown). Noble & Westbrook Mfg. Co., E. Hartford, Conn.
Circle Inform-A-Gram No. A7.

HOPPER FEED . . .

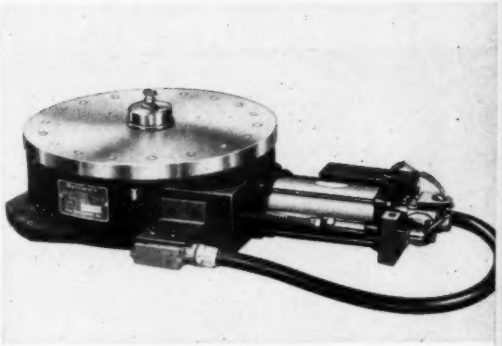
Designed to feed either rolling or sliding parts automatically to a production machine at a



predetermined rate, making that machine fully automatic, Feedall's new Hopper Feed No. 2200 has a low (36") loading height and variable delivery point. Feedall, Inc., Willoughby, Ohio.
Circle Inform-A-Gram No. A8.

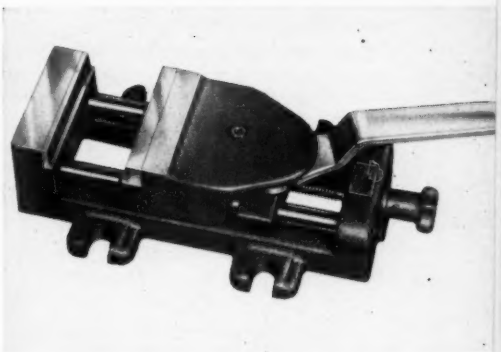
ACCURATE INDEXING .

Designed specifically for use where high accuracy in automatic feeding of work to tools is required, Model BRET-13, 13" dia. rotary index table can maintain repeat accuracies as close as 0.0005". Three styles are available: for fixed indexing or adjustable indexing. The Bellows Co., Akron, Ohio. **No. A9.**



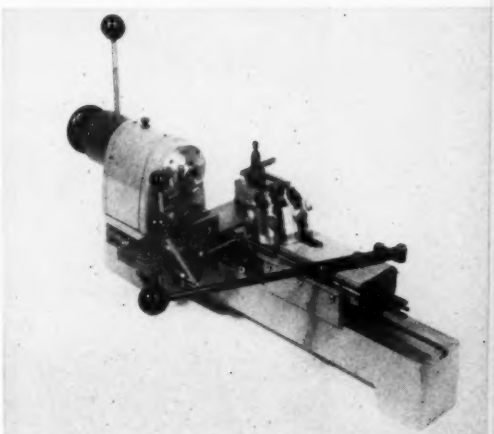
SPEED PRODUCTION . . .

Speed up production in drilling, milling, or general machine shop work when a quantity of duplicate parts must be held, with Model 4CL Camlock vise. The operator locks and unlocks the vise with one hand while inserting and removing pieces with the other. Heinrich Tools, Inc., 1536 Clark St., Racine, Wis., or — **No. A10.**



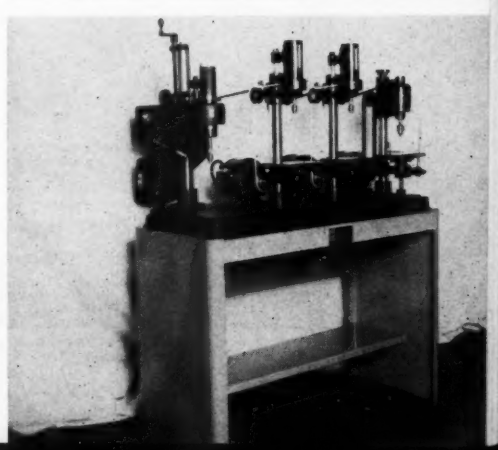
INSTRUMENT LATHE . .

F. W. Derbyshire has developed this ½" capacity instrument lathe that is light enough for fine work. "Model A" has a ball bearing headstock with a runout of less than 0.0001" at the headstock; it is equipped for lever collet closer, 6-position turret having ⅝" holes for tools, and double compound slide rest. F. W. Derbyshire, Inc., Waltham, Mass.
Inform-A-Gram No. A11.



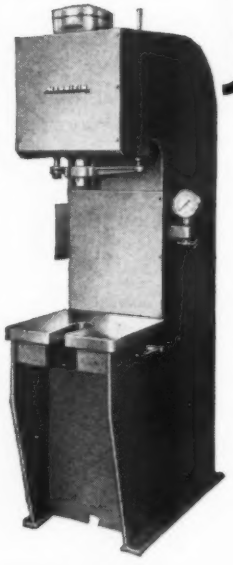
TAILORED MOUNTS . . .

A series of related "Super-Sensitive" drilling, reaming, and tapping operations can be brought under one responsibility with multiple spindle machines. The "tailored" machine mount shown holds 3 drilling machines and a tapper. The Hamilton Tool Co., 832 S. 9 St., Hamilton, Ohio, or —
Inform-A-Gram No. A12.



PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

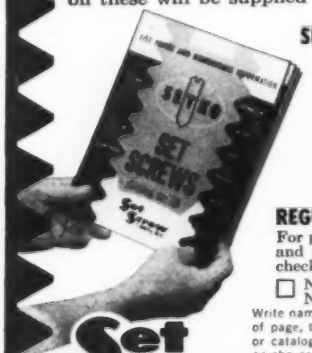
HANNIFIN CORPORATION, 563 S. WOLF ROAD, DES PLAINES, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1541

FREE... Latest Data on Problem-Solving

SET SCREWS

If you have puzzling set screw problems, check off below, the special type Setko Set Screws that seem to fit your need. Bulletins on these will be supplied promptly.



SPECIAL TYPES

- ☐ New Hopper-Fed Headless Set Screws*
- ☐ Self-Tapping Set Screws*
- ☐ Small-Size Self-Tapping Fasteners*
- ☐ PIVOT-LOK Set Screws*

REGULAR SET SCREWS

For prices and other special and general set screw data check

☐ New COMPLETE CATALOG No. 19.

Write name and address in the margin of page, tear out and mail. Bulletins or catalog will be sent promptly . . . no charge or obligation.

Set Screw & Mfg. Co. *Pat. Pending

158 Main St., Bartlett, Ill. (Chicago Suburb)

We Specialize in Solving Puzzling Set Screw Problems

CIRCLE INFORM-A-GRAM KEY NO. 1542

Eight Schools Show Research in Chicago

Eight universities will make a joint presentation of their latest research to industrial executives at the Production Engineering Show at Navy Pier, Chicago, Sept. 6-16.

The exhibits, which may have important influences on production techniques of the future, will cover results in both pure and applied research in the physical sciences. Among the outstanding displays will be the first public showing of the first operating scale model of a nuclear reactor for industrial uses.

Other highlights will include an exhibit on research in high speed metal cutting with a torque dynamometer and a thermocouple capable of measuring the temperature between the high speed tool and the surface being machined during the actual cutting operation; a punched tape control for milling machines; and a complicated "random programmer" which insures that products selected from the production line for testing are chosen at random, so that the tests are made on a proper statistical basis.

The universities taking part in the show are Case Institute of Technology, Cornell University, Illinois Institute of Technology, University of Illinois, Massachusetts Institute of Technology, University of Michigan, Northwestern University, and Ohio State University.

Shock Absorbers For Taxes!

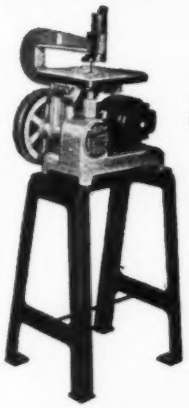
Possible tax savings due to the use of machinery mountings are revealed by a recent survey undertaken by Barry Controls Incorporated, Watertown, Mass., manufacturers of shock and vibration isolation equipment.

Tax laws vary, and in many areas machines not lagged to the floor are taxed as personal property and are subject to accelerated depreciation. Machines lagged to the floor may be considered part of the realty and are subject to taxes applied to that realty.

CUT TOOL AND DIE-MAKING COSTS WITH . . .

Milwaukee

DIE FILERS
PROFILE GRINDERS



DIE FILERS

. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices

PROFILE GRINDERS

. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY

328 PARK AVENUE — BELGIUM, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1551

ALL TYPES OF REAMERS

. . . THE RIGHT ONE FOR YOUR JOB

Piloted
Special Lengths
Special Diameters
Combination Cutting

Schmarje

CARBIDE REAMERS

STRAIGHT OR TAPER SHANK

Send drawings for Prompt Quotations

SCHMARJE TOOL & ENGINEERING CO.

Carbide Reamers • Form Tools

MUSCATINE 4, IOWA

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Get Speed! Get Precision!

KUTMORE ADJUSTABLE HOLLOW MILLS

• ANY COMBINATION OF . . . TURNING . . . TAPERING . . . FACING . . . CHAMFERING . . . TREPANNING IN **ONE PASS.** • EXCLUSIVE **MICROMETER** ADJUSTMENT FEATURE FOR RAPID SET-UP. • CUTTING CAPACITIES FROM 1/32" TO 2" DIAMETER IN STANDARD STOCK.

Our Engineering Department is at your disposal on your Hollow Mill problems.

1625 CLINTON AVE. NO.

CARL WIRTH & SON, INC.

Write For Catalog 20TD

ROCHESTER 5, N. Y.

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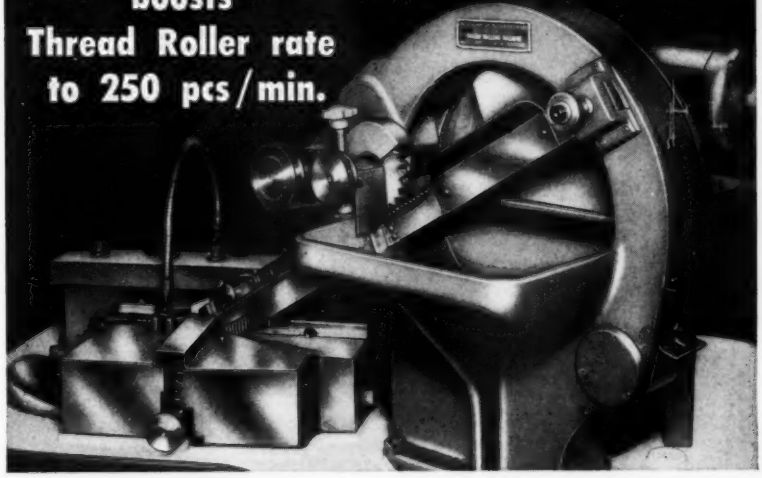
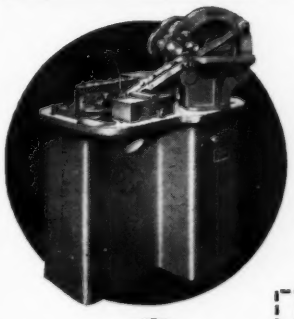
NEW ROTARY HOPPER

boosts Thread Roller rate to 250 pcs/min.





This new larger capacity rotary hopper has been designed for larger and faster production of parts to be threaded, knurled, burnished or grooved. Increased size means longer runs between refills and longer feed rails accommodate more pieces to prevent dry runs. The cast iron bucket prevents damage to the hopper and lifts out for servicing without disturbing any previous setting. Pieces up to .190" in diameter can be accommodated with maximum thread length capacity to 2". Write for new illustrated catalog now.

HARTFORD *Special*

MACHINE TOOL DIVISION — K-700-8
THE HARTFORD SPECIAL MACHINERY CO.
292 Homestead Avenue, Hartford 12, Conn.

☐ Send brochure on Automatic Thread Rollers.

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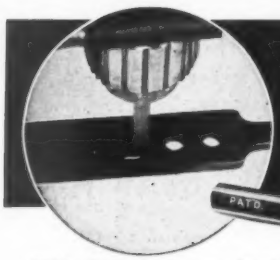
CIRCLE INFORM-A-GRAM KEY NO. 1554

Drill Hardened Steels without Annealing –



USE The New IMPROVED "HARDSTEEL" DRILL

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It— With "HARDSTEEL"

Also makers of— BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS *Write for information*

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CIRCLE INFORM-A-GRAM KEY NO. 1561

A New Concept in Optical Comparator Design...

new WILDER small parts Comparator model C

- *Vertical Design*
- *Erect Image*
- *Eye Level Screen*
- *Horizontal Stage*

An Entirely New Model Optical Comparator Designed for 100% Production Inspection
ACCURATE - FAST - INEXPENSIVE
Promotes Inspection Economy

If you manufacture mass produced parts that are now being inspected or should be inspected on an Optical Comparator, the new Small Parts Comparator will enable you to inspect them quickly, accurately and economically at a surprisingly low per-piece inspection cost.

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200-T LAFAYETTE STREET • NEW YORK 12, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1562

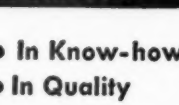
A SMALL LOT
METAL STAMPING SERVICE
AT LOWEST POSSIBLE DIE COST

FIRST...In Experience • In Know-how • In Research • In Quality • In Service

The sketch briefly describes the cost of a typical part made for one of our thousands of customers.

We have a short run stamping service to offer beyond comparison.

EXAMPLE



$57.50 for first 100 pieces including tools. $5.50 for each additional 100 pieces plus material.

Factory trained representatives in all centers. Write for full details.

DAYTON ROGERS *Manufacturing Company*
MINNEAPOLIS 7B, MINNESOTA

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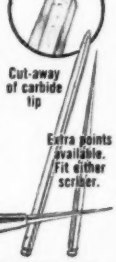
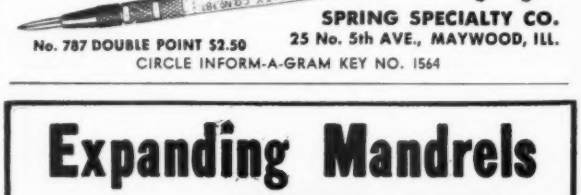
No. 676 SINGLE POINT $1.50

LEIGH Carbide SCRIBERS

Marks hardened steel, ceramics, plastics, gems, glass, etc. Polished aluminum body. Black-finish steel screw collets hold the points, easy to reverse for safety or adjust for length. Carbide point is ¼" diameter carbide rod approximately ½" long, copper-brazed into steel, ground to a point, and hand-polished, CAN BE RESHARPENED MANY TIMES. Steel point is hardened, and centerless ground to a long taper.

If your tool supplier can't supply, order direct, or write for catalog.





No. 787 DOUBLE POINT $2.50

SPRING SPECIALTY CO.
25 No. 5th AVE., MAYWOOD, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1564

Expanding Mandrels

Accuracy 001" - No Distortion
No Slipping - Everlasting

K.O. LEE CO.
ABERDEEN, SOUTH DAKOTA

If it's made by **Lee** *it's a* **"Knock-Out"**

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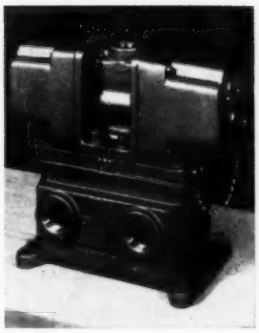
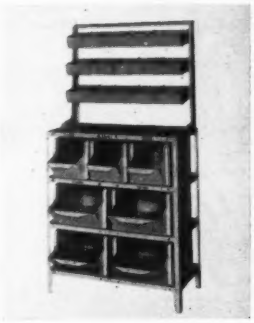
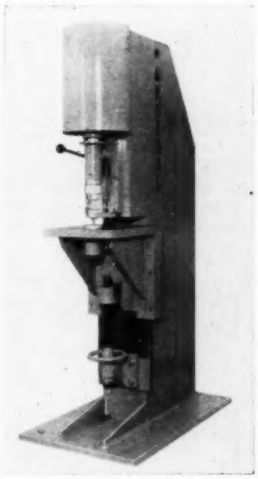


In Compliance with New J.I.C. Electrical recommendations, Hannifin's new Series BBJ-4 momentary contact 4-way "Pilot-Master" valves are electrically inoperative with solenoid covers removed. The covers are dust tight and splash proof. A manual operating button is located at the end of each cover. Hannifin Corp., 564 S. Wolf Rd., Des Plaines, Ill., or —
Inform-A-Gram No. A13.

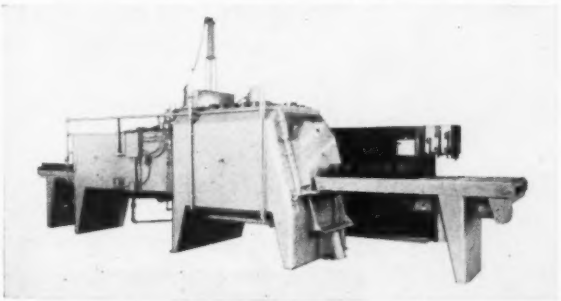


Greater Flexibility of Arrangements for parts storage and assembly operations is provided with the Module units made by Bathy Mfg. Co., Plymouth, Mich. Drilled holes in strategic locations permit grouping the stands into various units and the smooth top work area is designed for attachment of bench top bin units, as shown.
Inform-A-Gram No. A14.



For Rapid Assembling, Sizing, and accurate alignment of self-lubricating bearings in castings or other machined parts, General Riveters has developed a new press. In operation, a bushing is placed on a sizing arbor in the upper ram, while the workpiece is placed on the table. Depressing the starting lever starts the automatic 2-sec. cycle of inserting and sizing the bushing and removing the arbor from the bushing. General Riveters, Inc., 785 Hertel Ave., Buffalo 7, N. Y.
Inform-A-Gram No. A15.

Multiple Cooling Zones for air-cooling the work under a protective atmosphere is a feature of the new "TFC Series" heat treating units made by Ipsen. They make possible the carburizing, carbonitriding, normalizing, annealing, stress-relieving, and brazing operations under complete atmosphere protection to achieve bright, scale-free work. Get specifications from Ipsen Industries, Inc., Rockford, Ill., or —
Circle Inform-A-Gram No. A16.



Everybody talks about Quality

Quality
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Quality
Quality
Quality

At "CHICAGO" we DO something about it!

- **Metallurgical Control of raw materials**
- **Statistical quality control regulates all manufacturing operations**
- **Carbon restoration method of heat treatment eliminates decarb on heat treated products.**

Chicago Screws will assemble faster, with fewer rejects, and with a measurable reduction in costs.

Progressive action plus better methods of manufacture have kept "Chicago" out in front for 83 years.

"Chicago" Products are carried in stock by your favorite service-conscious Industrial Supply Distributor. Call him today. He can serve you promptly from his complete stocks—whether it be a package or a carload.

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CHICAGO SCREWS

The CHICAGO SCREW COMPANY
ESTABLISHED 1872
2519 Washington Boulevard
Bellwood, Illinois

The complete Chicago "Safety Plus" line includes in alloy steel: Socket Set Screws • Socket Head Cap Screws • Socket Stripper Bolts • Square Head Dog Point Set Screws • Socket Pipe Plugs • Flat Head Socket Cap Screws • Dowel Pins • Hexagon Keys and Key Kits • Also Socket Set Screws and Socket Head Cap Screws in Stainless. The complete "Chicago" line of Standard Products includes: Hexagon Head Cap Screws in steel—bright and Grade 5, heat treated, also in brass and stainless • Square Head and Headless Set Screws • Taper Pins • Steel Studs Flat and Fillister Head Steel Cap Screws • Hexagon Nuts in steel, brass and stainless.

CIRCLE INFORM-A-GRAM KEY NO. 1571

use a GRIPCO LOCK NUT

- To Hold Tighter
- To Last Longer
- To Cost Less

in these and hundreds of other applications where stress, wear or vibration is a factor. The Gripco Lock Nut, with its simple, one-piece design, has given industry a tighter, more positive holding action for quicker fastener application at less initial cost. No inserts, outside devices or complicated features – the Gripco Lock Nut holding or locking action is inherent in the nut itself – it costs less to use, gives an easier, faster locking and holds tighter for a longer time. Impervious to oil or water. For faster production, lower manufacturing and maintenance costs, look into the Gripco Lock Nut today.

GRIPCO PRODUCTS INCLUDE: Gripco Lock Nuts, New Gripco "Clinch" Nuts, Gripco Hi-Nuts, Gripco Pilot-Projection and Countersunk Weld Nuts with or without Gripco locking feature.

112

GRIP NUT COMPANY

308W S. Michigan Avenue, Chicago 4, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1581

WLS STAMPING COMPANY

3283 E. 80th Street • Cleveland 4, Ohio

SMALL LOT, SHORT RUN STAMPINGS made by the WLS Speedtooling method, assure you of low cost. Labor, per piece, can run as low as 6¢.

And, proportionately low prices apply to to your problems. This is actual proof that you can save money on short run stampings.

Send today for a FREE sample part, with a cost summary, and our bulletin which illustrates 40 small stampings. Send in your blueprints to our engineering department, also, for a prompt quotation.

Rejections? Only ½ of 1%. Permanent Tooling has no edge on us!

LOW DIE COST
FAST DELIVERY

- Blanking
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GIVE WLS YOUR STAMP OF

CIRCLE INFORM-A-GRAM KEY NO. 1583

SOLVE YOUR HOLE ACCURACY PROBLEM with *Horberg* PRECISION PIN GAGES

EXCLUSIVE CONCENTRIC ENTRY
TAPER for faster, more definite inspection of holes, for greater ease in centering.
Gage sets supplied for all common drill sizes.

TOLERANCE +0.0001 −0.0000

SETS. Two gages in each size, with convenient stand.

Letter Set (A-Z) 52 Gages $50.00
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ALL SHIPMENTS FROM STOCK

THE *Horberg* GAGE COMPANY
Affiliate of Horberg Grinding Industries, Inc.
79 Staples St., Bridgeport, Conn.

Please send Horberg Pin Gage Catalog to

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TITLE _____

(Please attach to company letterhead)

CIRCLE INFORM-A-GRAM KEY NO. 1582

$97.50

FULLY GUARANTEED

Order Today. Price $97.50 fob Clinton, Missouri. Includes motor bracket, V-Belt and motor pulley. (Less motor)

CUT COSTS WITH ALLEN PUNCH PRESS

2 Ton Power Bench Type

Powerful—Dependable—Economical

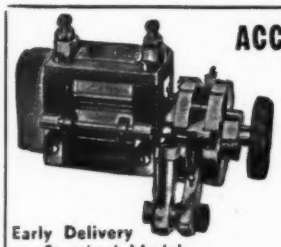
For Light Work — Stamping, Forming, Riveting—Metal, Fiber or other material. Overall height 20¼"—Base size 9" x 8¼". Die bed 6¼" x 8"—Ram face 1½" x 3½". Ram stroke ¾"—Positive ⅜" ram adjustment. Sturdy, Single pin, non-repeat hand lever clutch. V-belt drive—Weight 105 lbs. Requires only 1/3 H.P. motor. The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense.

FREE CIRCULAR

Dealer Inquiry Invited

ALVA F. ALLEN, Dept. TP, Clinton, Missouri

CIRCLE INFORM-A-GRAM KEY NO. 1584



ACCURACY with SIMPLICITY and LOW COST with "RFC" ROLL FEEDS

Models to fit:
ANY PRESS
FOR ANY JOB
FOR STOCK UP TO 12" WIDE

Early Delivery on Standard Models

"RFC" ROLL FEEDS are quality built for long, dependable service.

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ROLL-FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

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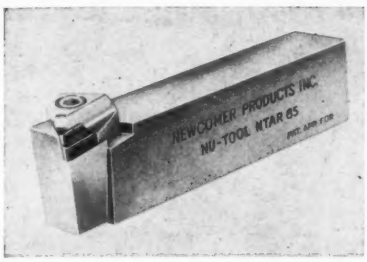
High Speed Oil Hole Drills are used either in a stationary position, as in a turret lathe or screw machine, or may revolve when used in special sockets made especially for this purpose. Continuous holes are drilled through the body and shank

of the drills for lubricant or air to pass freely to the drill point. This also aids in ejecting chips, dirt, or any foreign matter that may clog the drilled holes. Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill., or —

Circle Inform-A-Gram No. A17.

Here's an Economical Mechanical Tool Holder for use with NP "Throway" carbide inserts. It features a solid hardened and precision-ground tip-seating surface that provides proper support and seating for the



insert. All indexing stops for both insert and clamp are solid projections of the alloy steel holder. All have mechanical chip breakers. Newcomer Products, Inc., Latrobe, Pa., will supply literature.

Circle Inform-A-Gram No. A18.

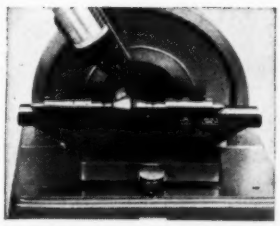
Job Set-Up on This New "Unimatic" Precision Boring Machine has been simplified to the point where very short runs can be made economically and efficiently using unskilled labor. It handles work up to 9" dia. and performs boring op-

erations to a depth of 6". The headstock has a built-in sine bar to implement accurate boring and turning of tapers. Detailed information is available from Atlantic Instrument Corp., Norwood, Mass., or —

Circle Inform-A-Gram No. A19.

Best Check for
Parallelism...
Squareness...
Angles...

Perkin-Elmer's Optical
ANGLE COMPARATOR



Checking taper angle (above). Checking micrometer for parallelism of anvil and spindle faces, thread runout and frame alignment (above, right).

Simplifies and speeds inspection of parts, even though difficult to approach by other means. Measurements read directly from graduated reticle. Operates entirely on optical principles—no physical contact with part required—precision is independent of the operator.

For descriptive booklet write:
The Perkin-Elmer Corporation, 818 Main Ave., Norwalk, Conn.

PERKIN PEC ELMER
Optical Tooling for the Modernized Machine Shop

CIRCLE INFORM-A-GRAM KEY NO. 1591

PDC **PDC**

AUTOMATIC INDEXING ASSEMBLY PRESS

CAPACITIES TO 6 TONS
14¾" DIAMETER DIAL PLATE
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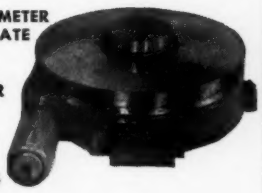
AUTOMATIC GENEVA MOTION INDEX TABLES

14¾" DIAMETER DIAL PLATE
ROTARY AIR MOTOR DRIVE
COMPLETE WITH ALL CONTROLS



PRECISION DETROIT CO. 20104 SHERWOOD DETROIT 34, MICH.

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DYKEM STEEL BLUE
Stops Losses
making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.

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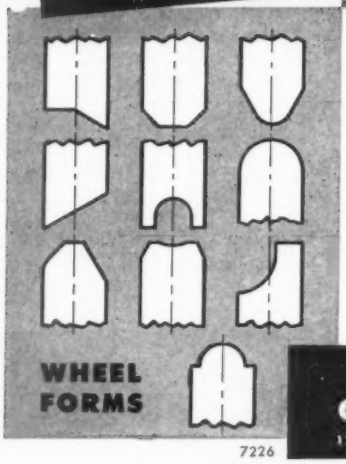
Precision Dress Grinding Wheels to ANY FORM IN ¼ THE USUAL TIME



WHEEL FORMS

The Perfex TANGI-MATIC Dresser is a self-contained precision tool built by an organization of master gagemakers for high precision work.

Any shop man who can read a "mike" can operate the dresser the first time. No Jo Blocks, no height gages or other auxiliary tools needed. All radii and angles are read directly.

Write for Descriptive Bulletin

PERFEX

PERFEX GAGE & TOOL CO.

123 AVERY ST. • MT. CLEMENS, MICH.

7226

CIRCLE INFORM-A-GRAM KEY NO. 1601

Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel.

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams...inch ounces,..inch pounds ...foot pounds (All sizes from 0-6000 ft. lbs.)

Every manufacturer, design and production man should have this valuable data. Sent upon request.

P A STURTEVANT CO ADDISON [QUALITY] ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1604

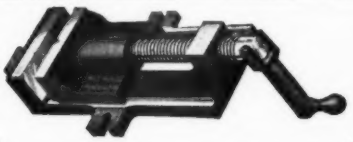
HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅜"—in any length.
Mirror finish surface to gage tolerance.
Many uses—
—core pins, punches, gages, ejector pins, insert pins, special tools, etc. — Quick delivery.

Write or phone MIllburn 6-4222 for price list D-3

WILLIAM T. HUTCHINSON CO.
P O B 328, UNION, N. J.
Factory: Springfield, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1602



YOST DRILL PRESS VISE

• This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type? *Write today for bulletin on the extensive Yost line*

YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 1605

LUCAS TOTE PANS

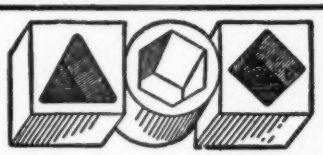
HELP SOLVE PRODUCTION PROBLEMS!

Lucas Tote Pans are built for long wear and ease of handling. Designed for every shop use—storing materials, holding parts for convenient handling by machine operators and at assembly lines, Lucas Tote Pans are available in nesting type, stacking type, straight side and assembly or bench pans. Lengths from 10" to 32", widths from 5" to 23" in standard sizes. Other sizes made to your specifications.

For Further Information, Write

J. L. LUCAS & SON, INC. Bridgeport 5P, Conn. Tel. CLearwater 9-3393

CIRCLE INFORM-A-GRAM KEY NO. 1603



DRILL THESE HOLES

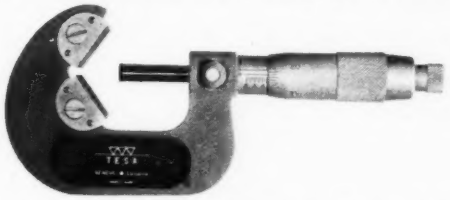
BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Penna.

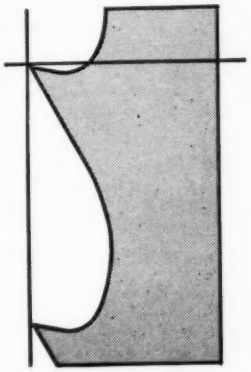
CIRCLE INFORM-A-GRAM KEY NO. 1606

Measure the Diameter of Cutters, reamers, end mills, screw taps, gear wheels, and similar tools and parts having uneven numbers of uniformly spaced flutes with

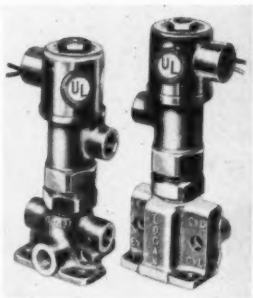


this precision special micrometer from Ernest E. Diener Co., 4779 Korte Ave., Dearborn, Mich. All measuring faces are carbide and the unit is available for 3, 5, or 7 flutes in ranges from 0.050" to 3.600".
Circle Inform-A-Gram No. A20.

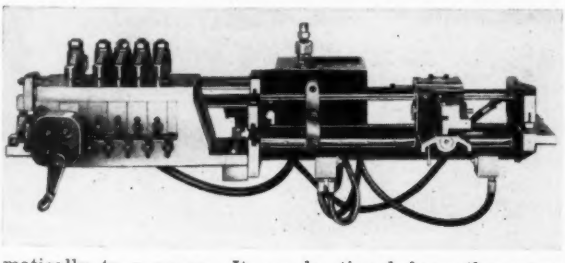
Positive Rake Band Saw Teeth have a forward inclination that "hooks" into the work to cut with greater ease than the conventional zero rake teeth. "Lenox" hook tooth band saw blades take higher cutting feeds and are recommended for cutting non-ferrous metals, woods, and plastics. The rounded gullets are designed for maximum chip clearance. American Saw & Mfg. Co., Springfield 1, Mass.
Inform-A-Gram No. A21.



More Air Control Valves have been developed by Logansport Machine Co. Model 6668 solenoid bleeder is an air cylinder-actuated 2 or 3-way valve for electric push-button, limit switch, timer, etc. control of bleeder and pilot operated valves. Model 6669 is the same, except it has two exhaust openings to permit bleeding both ends of a master valve alternately. Four-way, 2-position Model 6678 is for operating double-action air cylinders. Get drawings and complete data from Logansport Machine Co., Logansport, Ind., or —
Inform-A-Gram No. A22.



This Air Operated Slide Feed, available in five sizes with lengths of feed up to 36", has an open throat design which enables stock up to 18" wide to be fed auto-



matically to a press. It can be timed from the press crankshaft or ram, or may be installed to operate the press. Cooper Weymouth, Inc., 277 Noble Ave., Bridgeport 8, Conn.
Circle Inform-A-Gram No. A23.

CYCLONE SEPARATION

FOR MORE EFFICIENT DUST COLLECTION —FILTERS LAST LONGER

Almost all industrial dusts can be collected more efficiently by Dustkop. Thirty-seven standard models *ready to use!* Reduce installation costs — save space. Write for descriptive literature.

ALSO A COMPLETE LINE OF MIST COLLECTORS

DUSTKOP STOPS DUST

AGET MANUFACTURING COMPANY
1394 EAST CHURCH ST., ADRIAN, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1611

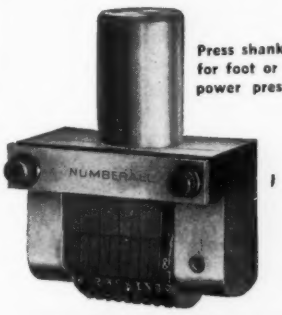
NUMBERALL
CUTS THE COST OF STAMPING NUMBERS

NEW MODEL 70

MULTI-WHEEL NUMBERING MACHINE

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Hand Shank



Press shank for foot or power presses

Write for Bulletin TP-70

Can be furnished in 1/32" to 3/8" high figures, sharp face gothic or shaded roman style. Automatic Numbering Heads also can be supplied.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1612

NOW, ANOTHER

DE-STA-CO FIRST...

3 NEW PORTABLE CLAMPS WITH

TRIGGER-RELEASE!

Model 484

Instant easy action enables operator to release clamp *with one hand!*

TRIGGER-RELEASE—Finger pressure on Trigger instantly throws jaws wide open, ready for next clamping action.

GREATER CLAMPING PRESSURES—Up to 1200 pounds may be exerted. Normal operating pressures of 300 to 500 pounds are easily obtained.

RUGGED CONSTRUCTION—60% heavier heat-treated forged components. Hardened bushings locked with spun rivet.

DE-STA-CO

Model 482

Model 486

Get all details! Write for DE-STA-CO Bulletin 482-4-6!

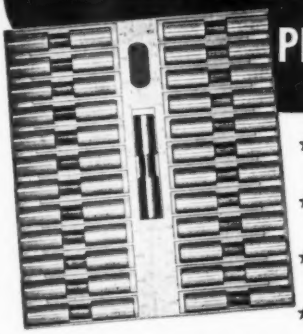
DE-STA-CO DETROIT STAMPING COMPANY

World's FIRST Line of TOGGLE CLAMPS

344 Midland Avenue • Detroit 3, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1621

CLOSER TOLERANCES with DELTRONIC TENTH PLUG GAUGES



★ Size variation by ten thousandths

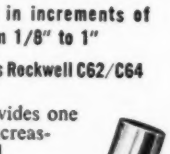
★ Set of 25 costs approximately same as Go and No-Go gauge.

★ Available in increments of 1/64" from 1/8" to 1"

★ Hardness is Rockwell C62/C64

This new system of precision gauging provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in .0001" increments and 12 gauges of decreasingly smaller sizes in increments of .0001". Each gauge is identified. It is the same size on both ends to double the life in usage.

For further information write Dept. D1.



DELTRONIC CORPORATION

1507 RIVERSIDE DRIVE • LOS ANGELES 31, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1623

Leading Auto Makers Save $1,250,000* On Dies Equipped With

ELASTICONE GUIDE PIN COVERS

**Actual savings reported during one year on materials, maintenance and manpower!*

Leading auto makers, like many other major industries, have reduced the costs of die operations by equipping dies with Elasticones. Elasticones close the gaps between pins and bushings, protecting pins against nicks and scratches, reducing die breakage, increasing press time!

Elasticones reduce the need for spare dies, make automatic press work possible. Write today for complete technical data and literature. Elasticones are available in stock and custom sizes.

CENTRAL

6603 MARSDEN STREET
PHILADELPHIA 35, PA.

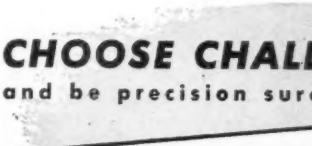
CENTRAL SAFETY EQUIPMENT COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1622

CHOOSE CHALLENGE . . .

and be precision sure!

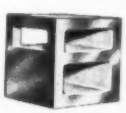
CHALLENGE SURFACE PLATES



New! Clovis Black Granite
Rated Class A. Surface accuracy guaranteed. 24 sizes.

Special Analysis Semi-Steel
Fine grain. Precision ground or hand scraped.

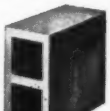
STRAIGHT EDGES for lathe bed ways. PARALLEL STRAIGHT EDGES for inspection of alignment.



UNIVERSAL BOX ANGLES Parallel to within .00025-inch.

V-BLOCKS V accuracy of .0005-inch.

ANGLE PLATES In 22 sizes for clamping & holding work.



BOX PARALLELS In every size for every use.

782

Challenge

THE CHALLENGE MACHINERY COMPANY

Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN
DEALERS IN ALL PRINCIPAL CITIES

CIRCLE INFORM-A-GRAM KEY NO. 1624

Two New Three-Fluted, Single-End Mills have been added to Arrow's line. The long style offers flute lengths from 1½" to 4" and the short style from ⅜" to 2". Arrow's 3-flute double-end mills offer

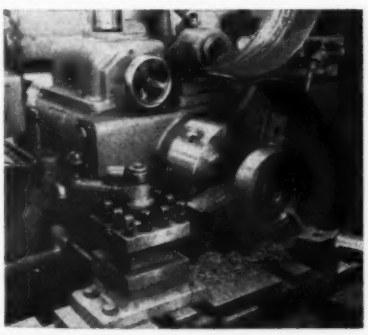
flute lengths from ⅜" to 1¾". The complete line is included in a catalog from Arrow Tool & Reamer Co., 418 Livernois Ave., Detroit 9, Mich., or — **Inform-A-Gram No. A24.**

Chip Breaker Grinding, as well as carbide grinding, is eliminated with the new Wendt-Sonis toolholder because a separate solid carbide chip breaker can be clamped on top of

the "throw- -way" inserts. A replaceable shim under the insert protects the holder body in the event of insert damage. Get Bulletin MTH-55 from Wendt-Sonis Co., Hannibal, Mo., or —
Circle Inform-A-Gram No. A25.

A Semi-Automatic Oil-Hydraulic-Operated Butt Welding machine for butt welding materials 0.015" dia. to ⅛" dia. and tubing 1/16" O.D. to ¼" O.D. has been designed and manufactured by Federal Tool Engineering Co., Cedar Grove, N. J. The machine itself is mounted on a portable table with wheels and can be moved to any convenient spot in the plant. It can be adapted for almost any shape material.
Circle Inform-A-Gram No. A26.

Two New Sizes in Air Chucks, 6" and 8", designed for smaller lathes, automatics, and screw machines, are announced by Buck Tool Co. They have the exclusive "Adjust Tru"



jaws which can be turned in the tool room and hardened keyways, and can be obtained with either two or three jaws. Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich., or — **Inform-A-Gram No. A27.**

Expect More with a **ROUSSELLE**

More strength where it counts...
More accuracy where it's needed...
More simplicity where it helps...
...to turn out first rate work FAST with steady, dependable regularity

You'll like the economical run-of-job cost, the simpler maintenance, the easier set up and operation and the wider variety of work each one can handle. And YOU'LL LIKE THE PRICE when you compare Rousselle specifications and quality . . . Ask for condensed catalog.

Rousselle presses are sold exclusively through leading machinery dealers.

SERVICE MACHINE CO. *Mfrs. of Rousselle Presses*
2310 West 78th Street - Chicago 20, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1631

MICRO-FINISH DRILL JIG BUSHINGS

80 TO 3/32
.0135 TO .0937

- High Micro-Finish for straighter holes. More uniform cutting pressure. Longer drill life.
- All standard body styles available.
- Drill sizes #80 to 3/32 (.0135 to .0937).
- Hole Diameter Diamond Lapped to (—.0000 +.0002)
- No counterbore. Full length support reduces flexing of drill, increases life and accuracy.
- Chamfered Hole protects against drill breakage.
- Concentric to .0002 (I.D. to body O.D.)
- Special sizes to your specifications.

ACME TOOL COMPANY
71 West Broadway, New York 7, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1632

ETALON No. 9

$40.00 F.O.B., N.Y.

HARDENED STAINLESS STEEL

Overall Length 12" *Measuring Capacity 8½"*

World famous for accuracy. Hand fitted Vernier slide insures smooth, snug operation. Wide Vernier, exceptionally easy to read. English or English and Metric graduations. LENGTH UP TO FIFTEEN FEET.

Fully Guaranteed

Handsome, form-fitting wooden case.

Ask Your Dealer or Write

ALINA CORPORATION
401 Broadway **New York 13, N. Y.**

CIRCLE INFORM-A-GRAM KEY NO. 1633

When New Molds Stick use IMS SILICONE FLUID

For Better Tool and Die Lubrication!

Shorten costly break-in periods! Simply spray on this perfect parting agent from self-dispensing aerosol! Useful too in PATTERN MAKING — releases patterns from master molds with minimum surface defects. Remember . . .

WHERE ANYTHING STICKS it always pays to try IMS SILICONE SPRAY

Get new tools into production sooner. Keep a few cans handy all the time. Order today!

DELIVERED PRICES
Single Can $2.00
Unbroken Dozen . . . $18.00
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INJECTION MOLDERS SUPPLY CO.
3514 LEE ROAD WYoming 1-1424 CLEVELAND 20, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1641

IS THIS OPERATION DONE IN YOUR PLANT ?

THEN USE THE 3 COMET "TIPS"

MADE OF HIGH SPEED or CARBIDE
FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

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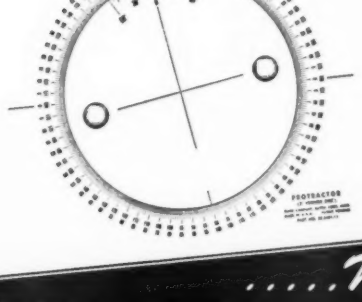

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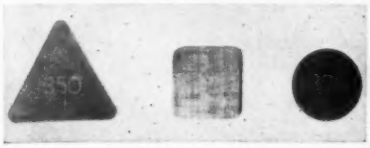

new Carboloy line. Nine basic sizes with different radii in triangular, round, and square shapes are ready-for-use on standard mechanical tool holders. Carboloy, Detroit 32, Mich.
Circle Inform-A-Gram No. A28.

The High Frequency Generators for induction and dielectric heating included in New Rochelle Tool's new line feature ultra-compact design without sacrifice of accessibility or durability. Motor generators are used to generate frequencies to 9600 cps, and vacuum tubes for 450 kc to 40 mc. Electrical and mechanical features of the units are described in a bulletin from New Rochelle Tool Corp., 322 Main St., New Rochelle, N. Y.
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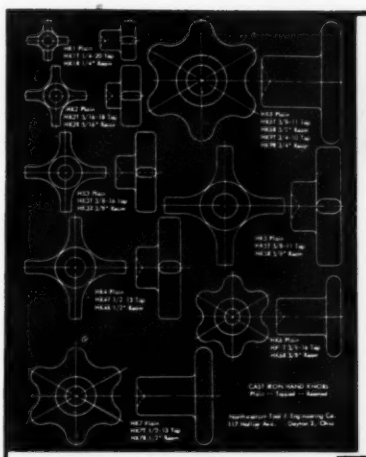
placing the punches with extreme accuracy. The machine cannot operate unless the rotating turrets are locked in place. Get complete information from Diamond Machine Tool Co., Pico, Calif., or —
Circle Inform-A-Gram No. A31.



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CIRCLE INFORM-A-GRAM KEY NO. 1651

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Hardened and Ground High Speed Steel

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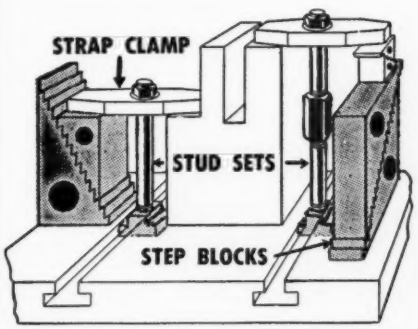

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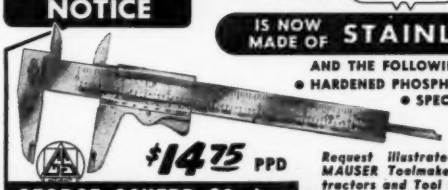

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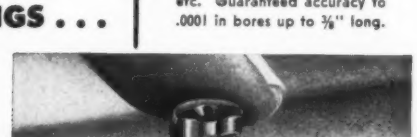

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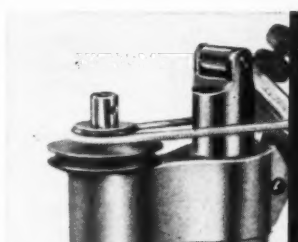

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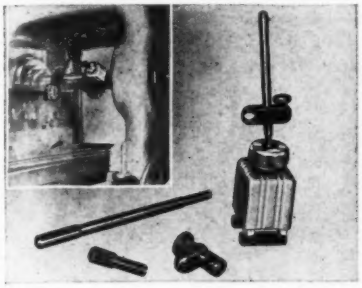

ing. Its stem is of non-magnetic material to isolate the magnet from the indicator. Enco Mfg. Co., 4520-26 W. Fullerton Ave., Chicago 39, Ill., or —
Circle Inform-A-Gram No. A32.

The Difficulty Frequently Encountered in the lubrication of metal to metal parts which are very tight fitting or where force fits are needed is alleviated with "Acrawax C Atomized," an extremely finely powdered lubricant. It is non-tacky, non-corrosive, insoluble in water, oil, and solvents, has a melting point of 285°F, and is a good dielectric. It is made by Glyco Products Co., Inc., Empire State Bldg., New York 1.
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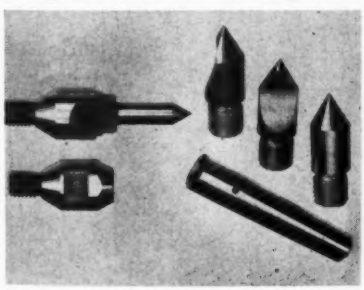
Circle Inform-A-Gram No. A34.

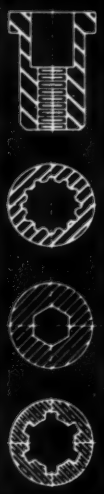
The Detachable Nose on the Boyd line of standard cutters can be removed from the shank, ground separately, and then returned without changing the exact centering. The



shank remains in the spindle of the tailstock or headstock. The noses are of high speed alloy steel or carbide tipped. Teaman Precision Products, 1426 W. 3 St., Cleveland 13, Ohio.
Circle Inform-A-Gram No. A35.

Le COUNT

SPECIAL MANDRELS for unusual bores



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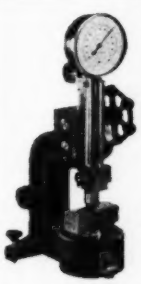
CIRCLE INFORM-A-GRAM KEY NO. 1671



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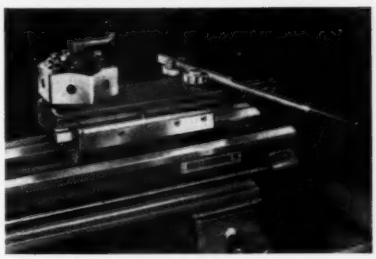

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Indexes ± .0005" at 4". Superfinished index pin. Automatic indexing and feed stops. Effective slide feed 4".

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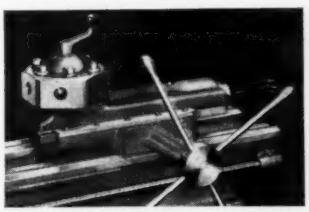
13"	CL1611T	308.



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Indexes ± .0005" at 4". Automatic indexing and feed stops. 5⅞" feed.

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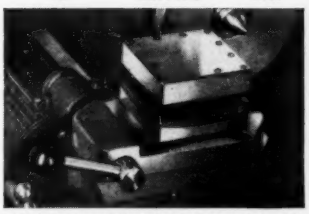

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In Large or Small Quantities

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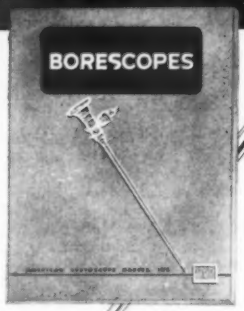

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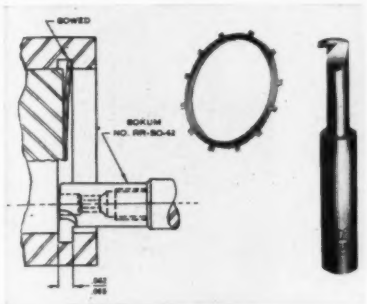

tools are of two-piece construction, permitting interchangeability of cutters on the same shank. Get details from Bokum Tool Co., Inc., 14775 Wildemere Ave., Detroit 38, Mich., or —
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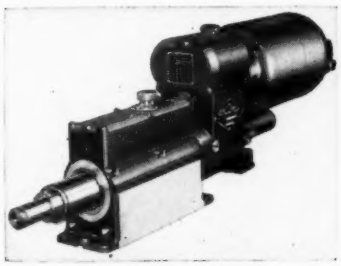
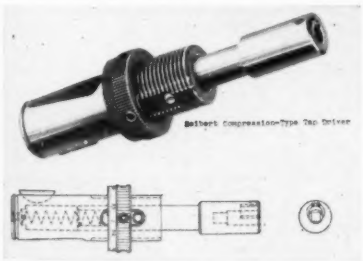
For Close Coupled Multiple Spindle tapping heads, Wisconsin Drill Head's new automatic lead screw tapping machine is furnished with flanged quill and slotted spindles. Limit switches at each end of the



quill travel protect against over-travel of the spindle, which stops instantly if the tap enters an undrilled hole. Wisconsin Drill Head Co., Butler, Wis., will send details on Model TU-415, or —
Circle Inform-A-Gram No. A37.

Two Improved Adjustable Tension and Compression Tap Drivers for use in spindles taking adjustable adapter shank tools are announced by Siebert & Sons, Inc., Chenoa, Ill. The tension-type driver is designed for



use when the spindle feed is less than the feed of the tap and the compression-type, when the spindle feed is greater than that of the tap. Taps are held by a trepan clamp (as shown) which is tightened by a set-screw. **Inform-A-Gram No. A38.**

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The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

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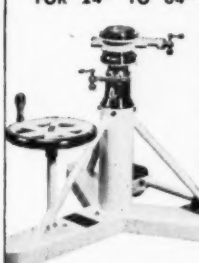

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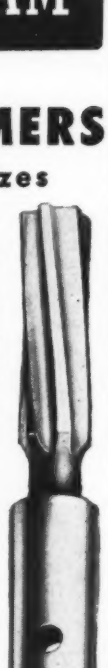
STUB REAMERS

in decimal sizes



For Screw Machines, Turret lathes and Drill Presses are the precise answer to all your special reaming problems. They are ground with **perfect accuracy** and backed-off to width of land and angle for the material to be reamed; Thus, tailor-made SUPEREAM STUB REAMERS mean extraordinary production efficiency and economy.

WRITE FOR INVENTORY STOCK LIST! Why buy a Decimal reamer as a SPECIAL — when you can buy the SUPEREAM DECIMAL REAMERS from stock for immediate delivery.

WRITE FOR BULLETIN #15

Uneeda LIGHT

DIRECTS A BEAM OF WHITE LIGHT ON YOUR CLOSE PRECISION WORK

Write for Bulletin #30
Created by a tool & die maker, who discovered so many practical applications for this special-lite. Particularly for close precision work. Increases efficiency—avoids eye-strain.

In emergency telephone: LIBERTYVILLE 2-4200

TWENTIETH CENTURY MANUFACTURING CO.

ROUTE 176 and BRADLEY ROAD
BOX 429TP LIBERTYVILLE, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1701

Sharpens 50 to 60 Screw Slotting Saws At One Time

Wardwell No. 57T sharpens milling cutters, slitting and screw slotting saws in gangs — in one setting. Automatically indexes the gang of saws, one row of teeth at a time, with grinding wheel shaped to gullet of tooth. Takes up to 250 saws .015" thick at one time.

Accurate . . . sturdy . . . durable . . . grinds wet or dry. *Write for Bulletin 57T.*

WARDWELL
Manufacturing Co.
3809 Ridge Road, Cleveland 9, Ohio
Maker of largest line of saw filing machines

CIRCLE INFORM-A-GRAM KEY NO. 1702

HANDY KNURLER

Here is a handy knurler which knurls material down to as small as 5/32" on drill press, lathe or other rotational means. Fine, medium and coarse, straight or diagonal knurls available.

Can be used in production by fastening to drill press table and feeding work through it. Pressure can be regulated to type of work.

Handy Knurler without knurls	**$10.25**
Handy Knurler with three medium diagonal knurls	**12.50**
Extra Knurls, per set of three	**3.60**

Shipped promptly from stock.

BRAND TOOL & SUPPLY CO.
907 So. Victory Blvd., Burbank, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1703

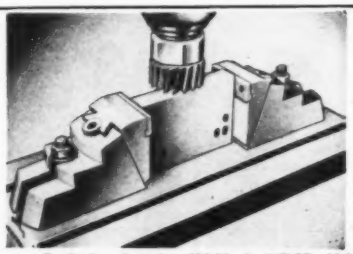
COOPER WEYMOUTH
OPEN THROAT
AIR OPERATED SLIDE FEED
For Power Press Operation

Operates on standard shop air lines. Easy to set up and adjust, holds to extreme accuracy. Made in five sizes. Feeds lengths to 36", up to 18" wide on mechanical and hydraulic presses.

Write for descriptive literature.

COOPER WEYMOUTH, INC., 277 Noble Ave., Bridgeport 8, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1704



MASTER GRIPPING CLAWS

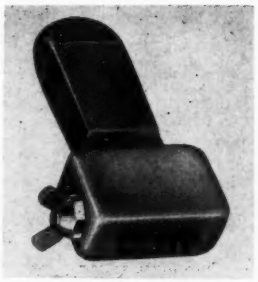
System Hubner

WHY use them?

1. Clamping action **Vertical** as well as Horizontal—pressing workpiece **down** directly on the machine table. No hammering and still no air between.
2. Gain more working room.
3. Faster and more secure setups. Easier to handle.
4. Unlimited jaw opening.
5. No straps overlapping on the workpiece; more machining surface.
6. Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

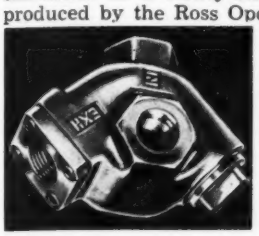
Exclusive Agents: KARL A. NEISE, 404 Fourth Ave., New York 16, N. Y., Dept. TP

CIRCLE INFORM-A-GRAM KEY NO. 1705

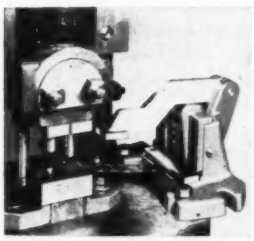


To Speed Type Changing, the special thumb screw spring plunger on this new type holder holds type securely in place yet can be opened and closed quickly to change the inserts. It is especially valuable for special "short run" marking operations and is made of Mecco safety steel. M. E. Cunningham Co., 1068 Chateau St., Pittsburgh 33, Pa., will supply information.
Circle Inform-A-Gram No. A39.

Important Structural and Operational refinements are embodied in a newly-designed Quick Exhaust Valve produced by the Ross Operating Valve Co., 120 Golden Gate, Detroit. Automatic opening of an oversized exhaust upon the reversal of the main operating valve permits almost instant discharge of exhaust. It is available in four models and pressure rating is 125 psig.
Inform-A-Gram No. A40.

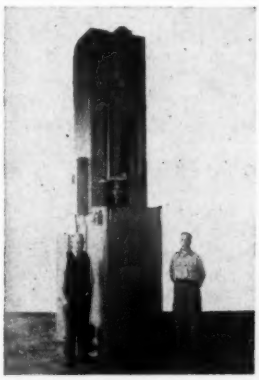


Shown Are Some of the Versatile Variations of "Super Precision" spindles produced by Standard Electrical Tool. They are scientifically produced, dynamically balanced, assembled, and tested in a dust-humidity - temperature - sound - controlled department to deliver extreme accuracy. The Standard Electrical Tool Co., Mt. Hope & 6 St., Cincinnati 4, Ohio, will supply details.
Inform-A-Gram No. A41.



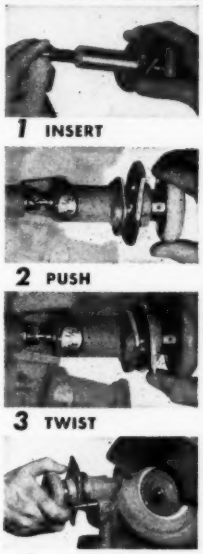
A Larger Size Ram Operated Scrap Chopper, Model M-3, has been tooled by Durant to handle material up to 10" wide and 0.100" thick. It is patterned after the successful smaller Durant choppers. Get complete details from Durant Tool Supply Co., 136 S. Water St., Providence, R. I., or —
Circle Inform-A-Gram No. A42.

Like Other Acme Vertical Pull Down Internal broaching machines, the new VPD-15-60, with 60" stroke, offers selective positioning of the upper broach retriever cylinder so that a considerable length range of broaching tools may be utilized. Broach handling is fully automatic for high production work and the unit readily lends itself to automated handling of work parts. Acme Broach Corp., Milan, Mich., or —
Inform-A-Gram No. A43.

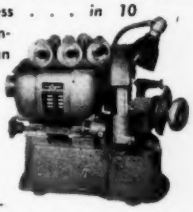


STOP WASTING DRILLS!

NEW LIFE FOR OLD DRILLS WITH BLACK DIAMOND DRILL GRINDER!



The BLACK DIAMOND Drill Grinder restores a worn drill to like-new precision sharpness . . . *in 10 seconds!* Any inexperienced man (or woman!) is an expert grinder with this unit. Both lips ground at once . . . web-thinning equally simple! Pays for itself many times over!



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BLACK DIAMOND

SAW & MACHINE WORKS

75 NORTH AVE. NATICK, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1711

here's a real twist for cutting costs...

JOMI TORQUE WRENCH

IMPROVES YOUR PRODUCT'S QUALITY...SAVES YOU TIME AND MONEY...

- **JUST SET YOUR TORQUE** Jomi automatically cuts out at the exact tension needed!
- **SOCKET WRENCH SIMPLICITY** precision torque limitation depends on wrench, not operator. Easy to use ...no dials or gauges to read!
- **CENTER OF TORQUE DESIGN** unvarying reading, regardless of hand position, or even long extension bars
- **CERTIFIED ACCURACY** written certification within 3%
- **SEALED TORQUE SENSING MECHANISM** protects precision parts
- **BUILT-IN DURABILITY** torture-tested through 50,000 cycles

▶ for torque requirements from 10 inch-ounces to 2000 foot-pounds

▶ designed to meet specifications MIL-H-4034A (USAF)

Write today for your free JOMI catalog with valuable Torque Table Data.

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"Industry's House of Torque"

Please send me Jomi's Torque Wrench Catalog

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CIRCLE INFORM-A-GRAM KEY NO. 1712

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WELDON

MEASURING ATTACHMENT

for Lathes

(Direct Reading)

Saves Time • Reduces Waste

• This handy Weldon attachment measures directly the forward or reverse movement of the lathe carriage, within .001 of an inch. Easily attached to most lathes by drilling and tapping of one hole. • Dependable, accurate, convenient . . . saves time and reduces work spoilage.

Write for Circular LA-1

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1721

FINEST SEEING TOOLS EVER DESIGNED

FOSTORIA

20th Anniversary

LOCALITES

for Machine Tools, Assembly, Inspection

Direct Light Exactly as you want it

ONLY $8.97 Each in std. pkg. of 4 List $10.55 ea.

Also Available with one arm

MODEL 55-CX-701

NEW Universal Arm Joints — Bend 135°. Large frictional triple disc bearing surface. Smooth, easy movement. Instantly adjustable by hand to direct light exactly as needed.

NEW Collar Disc Joints — Rotate 180°. Combination of 135° bend joints and 180° rotating joints provides amazing articulation for positioning reflector.

NEW Reflector — Bell shape with 6¾" orifice. Accommodates 100 watt A-21 lamp. Available with lens.

NEW Base — Universal for horizontal or vertical mounting. Outlet box base optional.

NEW Wiring—Keyless porcelain socket and separate toggle switch. 8 ft. SPT-2 18/2 heavy duty plastic rip cord with molded plug.

NEW Finish — Semi-gloss Vista Green baked enamel. Reflector interior, high temperature White.

WRITE for Complete Catalog of Localite models for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION • Fostoria, Ohio

Localites are available through wholesalers everywhere.

LOCALITE fostoria for Light ON the Job

CIRCLE INFORM-A-GRAM KEY NO. 1722

CARBIDE TOOLS *Precisionized by* GRAWELL

Grawell craftsmanship is inherent in Grawell Solid Carbide Tools . . . years of experience is reflected in the precision and long service life of these fine drills, end mills, reamers, grinding tools, centerlaps and burrs.

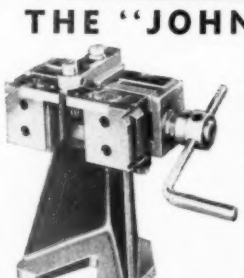
WRITE FOR NEW CATALOG TODAY DEPT. TP5

GRAWELL CARBIDE TOOL COMPANY

5680 12th ST., DETROIT 8, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1723

THE "JOHN'S" DRILL JIG



For cross or end drilling round, hexagon, or square stock or standard or odd-shaped castings from ⅛" to 8" O.D. the self-centering "JOHN'S" Drill Jig cuts tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. Bushing holders for multi-drill operations easily tooled. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Ideal for holding rough castings. Jigs available in three sizes 6", 8", 14"; jaw openings 2½", 3¼", 7½".

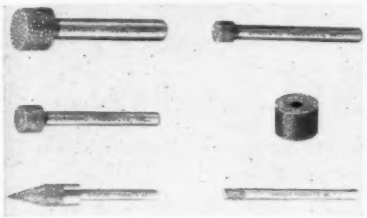
For information on hundreds of uses for jig or tooling recommendations for specific job, write:

HEUSER MANUFACTURING CO.

1642 N. PAULINA ST., CHICAGO 22, ILLINOIS

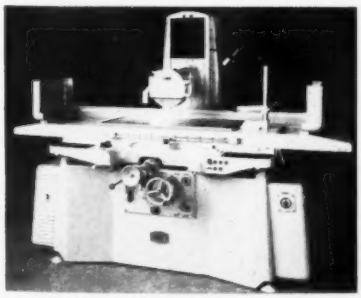
CIRCLE INFORM-A-GRAM KEY NO. 1724

New "Vinoy" Diamond Impregnated wheels have the crushed diamonds imbedded in a special carbide matrix. They're primarily for the carbide die industry—for grinding carbide dies and bushings—but may be used effectively on nitrided or case hardened steels. Get further details from Diamond Products, Inc., 326 Pospect Ave., Elyria, O. or — **Circle Inform-A-Gram No. A44.**



This Seven-Power Measuring Magnifier may be used to check finishes, templates, bores, dies, layouts, the cutting edges of tools, etc. Its transparent sides permit maximum illumination of the object under study and a removable metal base permits use without scales or with any one of four available scales. It's manufactured by Bausch & Lomb Optical Co., Rochester, N. Y. **Circle Inform-A-Gram No. A45.**

For Added Precision Plus Operating Smoothness and long life, the saddle and table of the new Blohm horizontal surface grinder are carried on ball bearing assemblies operating on hardened, precision-ground chromium-nickel-steel ways. Its 5-hp motor is mounted directly on the spindle, which works on adjustable tapered bronze bushings with pressure lubrication. Get details on all the features from Maserati Corp. of America, Westbury, N. Y. **Circle Inform-A-Gram No. A46.**



WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p. G. E. Motor

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little.

complete with cord, plug, switch ready to use $89.95

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

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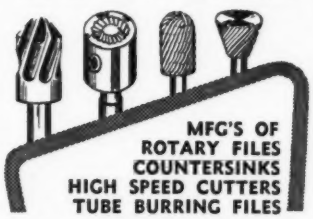
A $ SAVED IS A $ EARNED

Save Dollars By Using Our Re-Sharpening Service

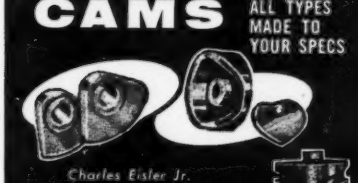


MFG'S OF
ROTARY FILES
COUNTERSINKS
HIGH SPEED CUTTERS
TUBE BURRING FILES

BEAVER
ROTARY FILE COMPANY
400½ E. Slauson Ave.
Los Angeles 11, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1732

CAMS ALL TYPES MADE TO YOUR SPECS



Charles Eisler Jr.
President

EISLER ENGINEERING CO., INC.
732 SO. 13TH ST., NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1733

Lower Cost
Greater Speed

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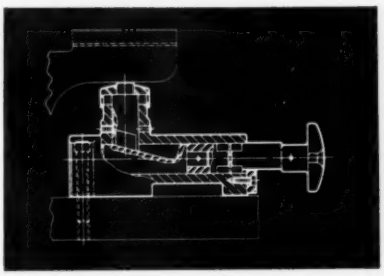
Why go through the costly motions of making your own jig and fixture parts? **Lodding** mass-produced line is as handy as your nearest Lodding distributor —in all industrial centers— to meet your every need.



Lodding Heavy-duty Jack Assembly is the modern way to support work while machining. Makes obsolete makeshifts like screw jacks and shims. Made in three sizes.

Fast . . . . positive . . . . accurate.

Design and build fixtures and jigs with the Lodding catalog at your elbow. The savings will make you happy.

Lodding INC.
84 BEACON ST., WORCESTER 1, MASS.
THE STANDARD LINE OF JIG AND FIXTURE COMPONENTS

CIRCLE INFORM-A-GRAM KEY NO. 1734

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

Model JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.
212 Waubesa St. • Madison 10, Wis., U.S.A.
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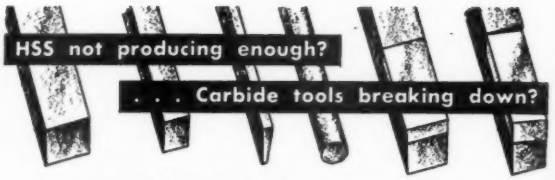


Use CROBALT cast alloy tools!

CROBALT cast alloy cutting tools outwear and outproduce HSS . . . withstand shock and vibration far better than carbides . . . give 15% to 35% more pieces per grind than other cast alloys! They've been proven through 23 years in the largest metal-working plants; and today they're better than ever. Try them and see!

FREE CROBALT BULLETIN
describes the conditions where cast alloy tools are BEST — and tells how to use them to full advantage. In it, you may find the way to higher production at lower cost. Write for *Bulletin 101*.

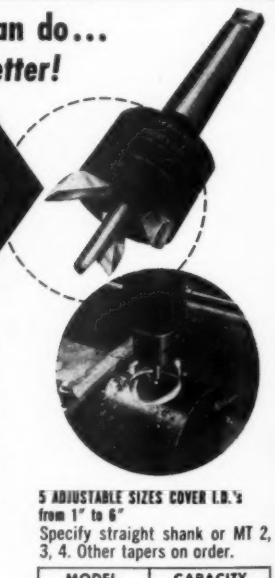
DISTRIBUTORS: We invite your inquiries.

Crobalt, Inc.
2800 S. State St., Ann Arbor 5, Michigan

West Coast: 111 Eucalyptus Dr., El Segundo, Calif.
CIRCLE INFORM-A-GRAM KEY NO. 1742

Does jobs no drill can do...
Does many jobs *better!*

Clark
"HOLE-MAKER"



Produces round, true holes in CASTINGS, FORGINGS, BOILER PLATE, THIN SHEET STOCK, PIPE, TUBING, ETC.; Drills CROWNED, CYLINDRICAL, FLAT OR WEBBED SURFACES!

No triangular shaped holes, no grabbing on break-throughs, no "walking" on starts with the Clark "HOLE-MAKER"! Produces full-gauge holes from start to finish. Removable pilot guides HOLE-MAKER straight and true even on intermittent cuts. Will also use pilot drill.

Ideal production tool on TURRET LATHES, CHUCKING MACHINES, RADIAL DRILLS, DRILL PRESSES, PORTABLE ELECTRIC and PNEUMATIC DRILLS. Excellent for rough boring, finishing and trepanning. Cuts all ferrous and non-ferrous metals and other materials. Saves money, replaces large drill inventory... Bores castings, forgings, etc. 3 to 10 times faster than single pointing!

5 ADJUSTABLE SIZES COVER I.D.'s from 1" to 6"
Specify straight shank or MT 2, 3, 4. Other tapers on order.

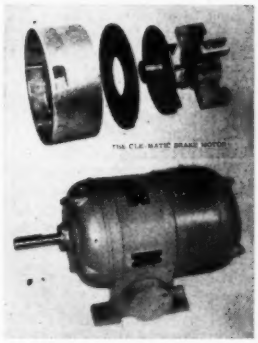
MODEL	CAPACITY
102	1"—2"
203	2"—3"
304	3"—4"
405	4"—5"
506	5"—6"

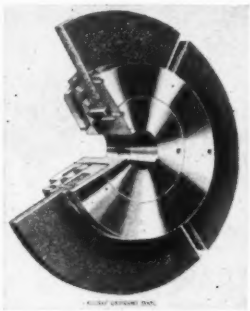
When ordering, specify material to be cut.

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.
CIRCLE INFORM-A-GRAM KEY NO. 1743

One of the Most Recent Additions to the Bokum line is the "Rapidor" turning tool for roughing, semi-finishing, finishing, cutting-off, threading, and forming. Its four types of high speed steel or carbide tipped cutting heads are interchangeable. Ask for Catalog No. 454 from Bokum Tool Co., Detroit 38, Mich., or —
Inform-A-Gram No. A47.

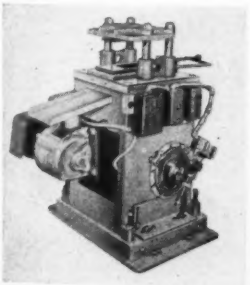
This New Mechanical Motor Brake is built into the motor frame and enclosed in the housing, saving as much as 7⅜" in length. It allows for quick opening and avoids sudden impact on stopping. It can be installed in any position and is especially designed for work requiring frequent braking. The Cleveland Electric Motor Co., Dep't MB, 5213 Chester Ave., Cleveland 3, Ohio.
Inform-A-Gram No. A48.





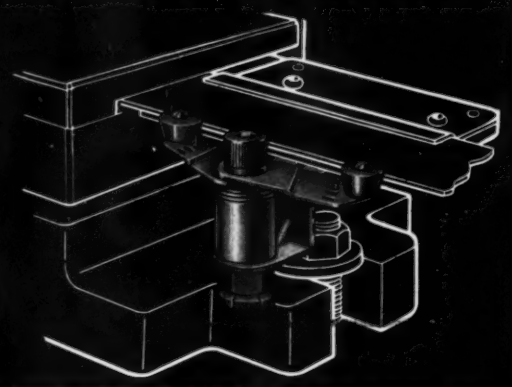
Equivalent of an "Extra" 1½" dia. on a standard 7" grinding wheel can be used without altering peripheral speed or diameter of the grinding tool with the new "constant diameter" Kodiak grinding tool distributed by Continental Products, Inc., Dep't 1C 872 E. 140 St., Cleveland 10. The tools fit all standard grinding machines, and abrasive segments are replaceable.
Inform-A-Gram No. A49.

The New and Smaller Version of the Universal 3-way precision angle-set vise is designed particularly for compound and simple angle grinding. Model No. 3 has a 3¼" jaw opening and jaws 2¾" wide, and is fully adjustable in three planes. Base and cradles are fully graduated and the vise has a square base for squaring against the rail of a magnetic chuck. Universal Vise & Tool Co., Parma, Mich., or —
Inform-A-Gram No. A50.



This New Flying Cut-Off Press is designed to provide accurate high speed production in cutting off roll formed metal shapes. Coil stock can be used instead of cut lengths, effecting many economies such as reducing the amount of scrap and production of more uniform shapes. Operating speeds of 240 to 300 rpm are available and capacities from 4 to 124 tons. Dahlstrom Machine Works, Inc., 4225 W. Belmont St., Chicago 41, or
Inform-A-Gram No. A51.

NOW...
A Low-Cost Stock Guide



NEW DANLY ROLLER STOCK GUIDES AND GUIDE RAILS

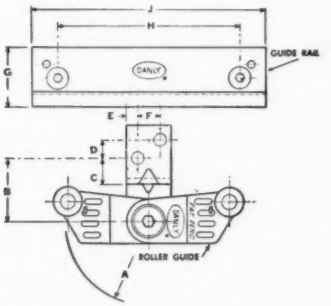
READY MADE—QUICK TO INSTALL

Versatile...for use on dies or in any operation where coil or strip stock must be guided.

Low-cost...the cost is only a fraction of the shop expense necessary to tailormake a guide.

Rugged...constructed entirely of steel. Rollers, arms, collar and bracket are hardened. Adjustable, three-coil music wire spring.

Roller Guide, Large.....$4.50 each
Roller Guide, Small.....4.00 each
Guide Rail.....$3.50 box of five (all one size)
(Discount for quantity orders)



Roller Guide Dimensions, Inches

	Cat. No.	A	B	C	D	E	F
Roller Guide Large	9-70-6	2 3/64	1 15/32	3/8	1/4	5/16	7/16
Roller Guide Small	9-60-6	1 27/64	1 1/16	7/16	5/16	3/16	3/8

Danly Roller Stock Guides packed one to a box unassembled, furnished with light or heavy-duty spring for optional use plus all necessary mounting screws and mounting instructions.

Guide Rail Dimensions, Inches

	Cat. No.	Max. Stock Thickness	G	H	J
Guide Rail	9-8025-6	.025	1	3 1/8	4
	9-8045-6	.045	1	3 1/8	4
	9-8080-6	.080	1	3 1/8	4
	9-8125-6	.125	1	3 1/8	4

Danly Guide Rails packed five of one size per box, furnished with mounting screws and dowel pins.

For immediate delivery, specify catalog number and mail orders to

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue • Chicago 50, Illinois

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RAPID CABLE AND TERMINAL CONNECTORS

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When ordering, specify amount and bolt thread size.

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A NEW LOW COST Impact AIR HAMMER

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Most jobs done on expensive, heavy presses can *now* be done faster and cheaper by the light low-priced Mead Air Hammer using the new adjustable, spring*less* "Bullet Velocity" MEAD AIR TRIP! It delivers blows equivalent to 7½ tons down to as little as a few ounces—at several blows per second, if desired! Enjoy the *competitive benefits* of really low cost production with durable, powerful, improved Impact Air Hammer. Put Mead "how-to-do-it" experience to work for you.

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Pathfinder in AIR POWER AUTOMATION

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★ Wider Range...1 Tapper Handles #0 to ¾" Taps

★ Automatic Tap Protection

★ Furnished to fit any Drill Press

Commander—"The Tapper That Thinks For Its Operator," has the adjustable full range torque control that instantly stops any tap when it becomes dull, loaded, strikes a hard spot or bottoms in blind hole tapping. Assures maximum tap protection, higher production, even with inexperienced operators.

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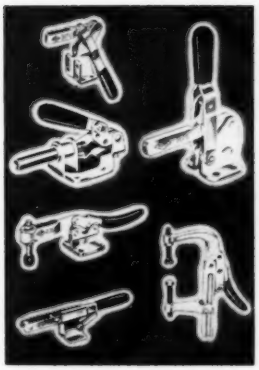
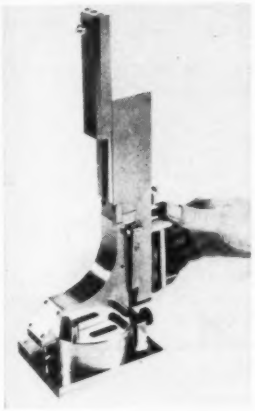
4228 W. Kinzie St. Chicago 24, Ill.

"Product of Commander... Builder of Production Tools

CIRCLE INFORM-A-GRAM KEY NO. 1764

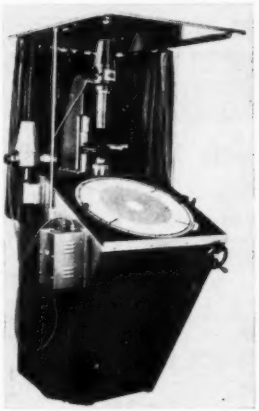
New Red Vinyl Plastic Safety-Ease Handle Grips—created to lesson worker fatigue and to provide greater safety and ease to operators' hands — are now standard equipment on almost all models of De-Sta-Co toggle clamps. When jolting manual pressures are applied to clamps during opening or closing, the cushion effect of the plastic minimizes the possibility of bruises. Detroit Stamping Co., Detroit 3, Mich.
Inform-A-Gram No. A52.



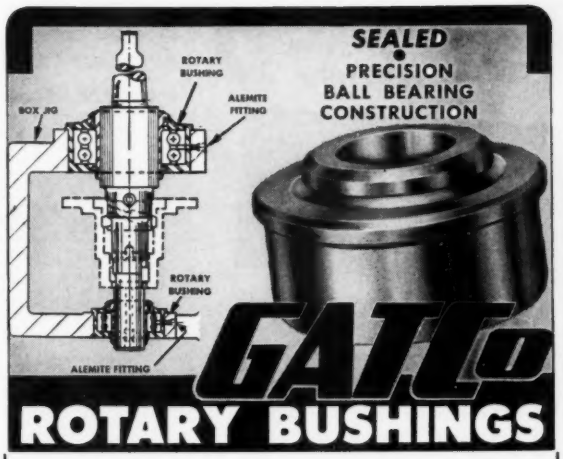


The Diamond Elevator Extension Model of the Fluid-motion wheel dresser makes the dresser fully adaptable to all types of grinders. It permits dressing wheels up to 24" dia. and is adaptable to internal and cylindrical grinder applications. J. & S. Tool Co., Inc., 87-123 Dorsa Ave., Livingston, N. J., will send details. In form dressing it increases the range of diamond positions and permits elevation adjustment up to 6".
Inform-A-Gram No. A53.

This New Contour Projector completely eliminates the need for special contour charts. Sharp, distortion-free images are projected directly to a large screen for observation, inspection, and measurement. Direct readings are taken with an enlarged drawing, glass scale, or table micrometer. Enlarged drawings can be made directly on the glass screen. Nife Inc., Copiague L. I., N. Y., or —
Inform-A-Gram No. A54.



A New Feeding System employing a rotary-type hopper has boosted the efficiency of the new Model A-190-R Hartford Special thread rolling machine by as much as 75%. Production rate is now 230 to 250 pcs/min. A built-in vibrator assures positive positioning and feeding of blanks, reducing jamming to a minimum. The Hartford Special Machinery Co., 287 Homestead Ave., Hartford 12, Conn.
Circle No. A55.



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HIGH SPEED
HEATING UNITS

- Use city gas and air—equipped with high speed burners.
- Handle large variety of sizes and shapes. Available with stationary or rotating holding fixtures.
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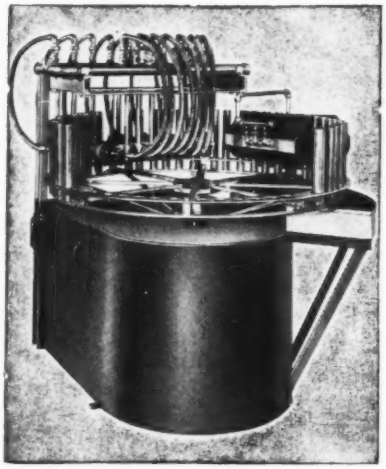

G.A.S. Turntable Heating Unit — annealing center sections of brass Tubes

GAS APPLIANCE SERVICE, INC.
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all can be done on a

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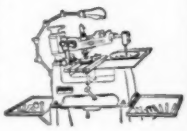
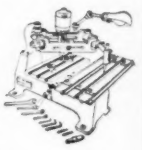
Model 3D-5 Three Dimensional Engraving and Die Cutting Machine features reversible spindle for enlarging and reducing from a model, die or sample.



Model CG Cutter Grinder for grinding engraving and routing cutters.

Model UE Engraver for metals, plastics and other materials. Attachment available for electrical marking or acid etching hardened steel.



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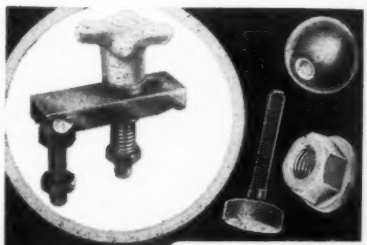

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You Need an Extra Hand Now to Speed Up Production!

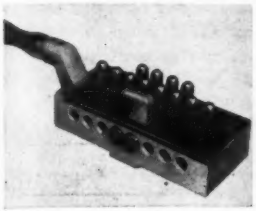
HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

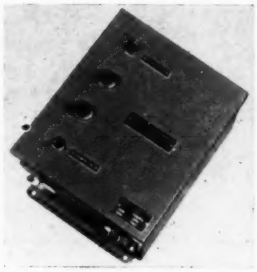
HEIMANN MFG., CO. • URBANA, OHIO.

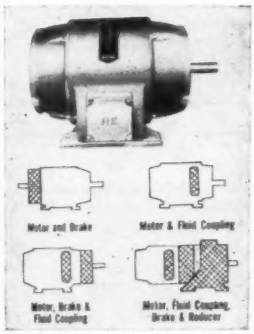
CIRCLE INFORM-A-GRAM KEY NO. 1783

To Widen the Applications for "Luminum-Line" plate holders, M. E. Cunningham Co. developed Model LP-3S, a 3-line holder which includes a combination of single and multiple character steel stamps to handle name identification, serial number, etc. Tension is controlled on the individual spring retaining plungers so the stamper can change stamps quickly. M. E. Cunningham Co., 1086 Chateau St., Pittsburgh 33, Pa. **Circle No. A56.**



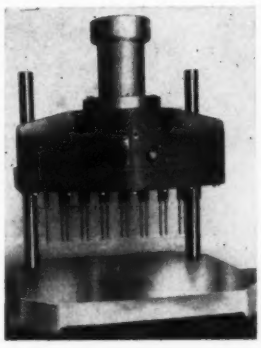
The Press Clearance Control prevents press damage due to failure of parts ejectors by blocking the next stroke upon failure of the automatic unloading devices. The automatic shut-off works from an impact accelerometer mounted on the receiving tote box or the unloading mechanism, and action is so rapid that there is no interference with normal production unless a part remains in the dies. Control Devices, Inc., 8299 E. 9-Mile Rd., Van Dyke, Mich.
Inform-A-Gram No. A57.





The Many Unique Single-Frame Combinations of motors, brakes, fluid couplings, and gear reducers possible with the "Xpandable" basic motor design saves appreciable costs over buying and aligning separate units in tandem. Combinations are achieved through use of standard interchangeable assemblies, resulting in tailor-made power packages. Get engineering data from Reuland Electric Co., Alhambra, Calif., or —
Inform-A-Gram No. A58.

Multiple Hole Drilling in a straight line reduces drilling time and fixturing costs, in addition to reducing the number of machines required for some jobs. The new series of "In-Line" drill heads manufactured by Zagar drill, ream, and tap holes in a straight line—as close as the sum of the two smallest diameters. Drill sizes from ⅛" to ¾" are available. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.
Inform-A-Gram No. A59.



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SERVICE MACHINE CO., INC.
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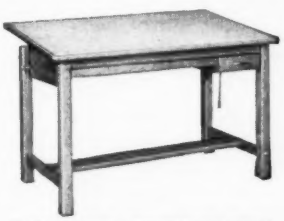
MAYLINE



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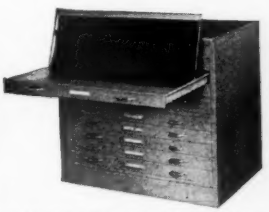
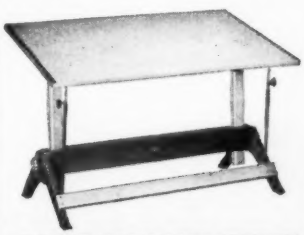


PLAN FILE WITH HINGED COVER



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Sheboygan, Wisconsin

MAYLINE

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the right combination for pressroom AUTOMATION

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LITTELL ROLL FEED

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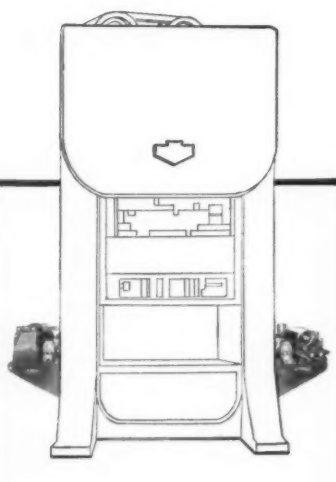

Precisely the right roll feed for your needs is in the complete Littell line . . . whatever the make or size of your press.

Write for the LITTELL Roll Feed Catalog

F. J. LITTELL MACHINE CO.

4197 N. Ravenswood Ave., Chicago 13, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1801

List Papers for Presentation by Body Engineers

"Sports and Racing Cars" is the first paper scheduled for presentation at the 1955 Technical Convention of the American Society of Body Engineers in Detroit, Oct. 26, 27, and 28.

ASBE President W. K. Norwick reports that other subjects to be covered at the annual convention will include "The Continental Story," "Testing a New Body," "What's New," "Body Materials," and "Product Planning."

Awards for the Body Drafting Contest for high school students, sponsored by the Society, will be presented at the Convention.

Production Service Co., Cleveland, now offers the complete line of air gages; special reconditioning service, gage engineering; built-up gages, gage blocks; and accessory sets in the Northern Ohio area for Freeland Gauge Co. of Detroit.

The Blair-Martin Co., Inc., of S. Pasadena, Calif., is representing The Barth Corp. in Southern California, Arizona, and New Mexico. Barth specializes in control panels and other equipment for automation, as well as progressive dies, aircraft actuators, spar milling and other special machine tools.

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Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

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DAVIS TOOL and ENGINEERING CO.
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Women Engineers Install National Officers

Lois G. McDowell, assistant professor of mechanical engineering at Illinois Institute of Technology, Chicago, was installed last month as national president of the Society of Women Engineers.

Dorothea H. Perry, at the same time, assumed the office of vice president; Doris M. Gainor, treasurer; Roslyn K. Gitlin, corresponding secretary; Martha J. Bergin, recording secretary; Miriam M. Gerla, Marie Reith, and Dot Merrill, directors-at-large.

The newly-elected SWE president was the first woman to receive a master's degree in mechanical engineering at Illinois Institute of Technology and one of the first four women engineers accepted by Renssalaer Polytechnic Institute.

At Renssalaer, Mrs. McDowell was named an honorary member of Tau Beta Pi, highest national engineering honorary, which accords full membership to men only. She is also a member of Pi Tau Sigma, national mechanical engineering honorary, and Sigma Xi, national honorary research society.

Lees-Bradner to Cold Form Gears

A step forward in gear manufacture is announced with the licensing of the Lees-Bradner Co., Cleveland, Ohio, by Grob, Inc., to develop, manufacture, and market the Grob Gear Rolling Process.

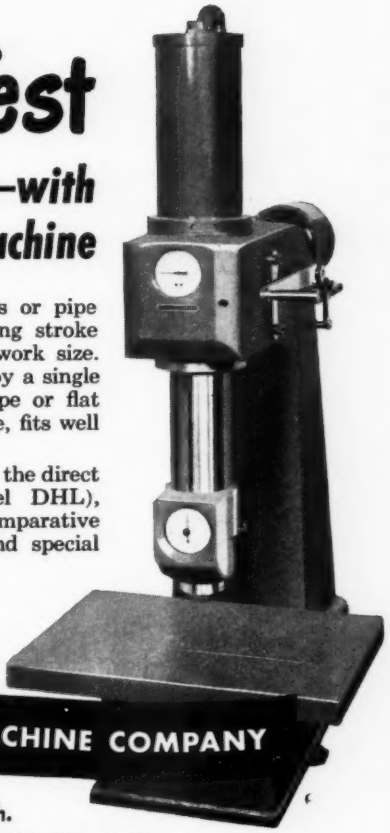
In contrast to normal methods for cutting gears and splines, the Grob Process actually cold forms the metal, causing it to flow to the desired shapes and dimensions. Photomicrograph inspection of the finished pieces shows a refinement and improvement in the grain of the metal, with a resultant increase in strength.

The process holds time and money-saving possibilities: the expense of hobs and coolants is entirely eliminated and material waste is virtually eliminated.

Unlike methods limited to shallow serrations, the Grob Process produces both gears and splines to the standard tooth depths in normal use today.

Brinell Test

large pieces fast—with this long stroke machine



Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

9386 Grinnell Ave., Detroit 13, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1811

"COSTS CUT 60¢ per hour per machine"

"...simplified our time study and cost analysis."

"...and, we will install your units on all our machines."

"...meets all our requirements. Ship 35 more units at once."

—just a few of the many comments we receive daily about...

TIME RECORDER-TOTALIZER

PRICE $55.

• This precision instrument provides accurate, permanent, chronological data about any machine, process or system in plant or office...on a continuous chart-roll which lasts four months. Uses no ink. Totalizer shows accumulated "on" time.

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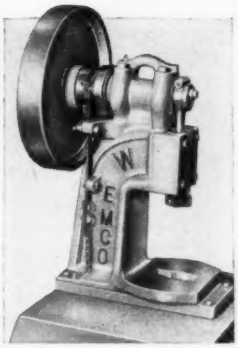
CIRCLE INFORM-A-GRAM KEY NO. 1812

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



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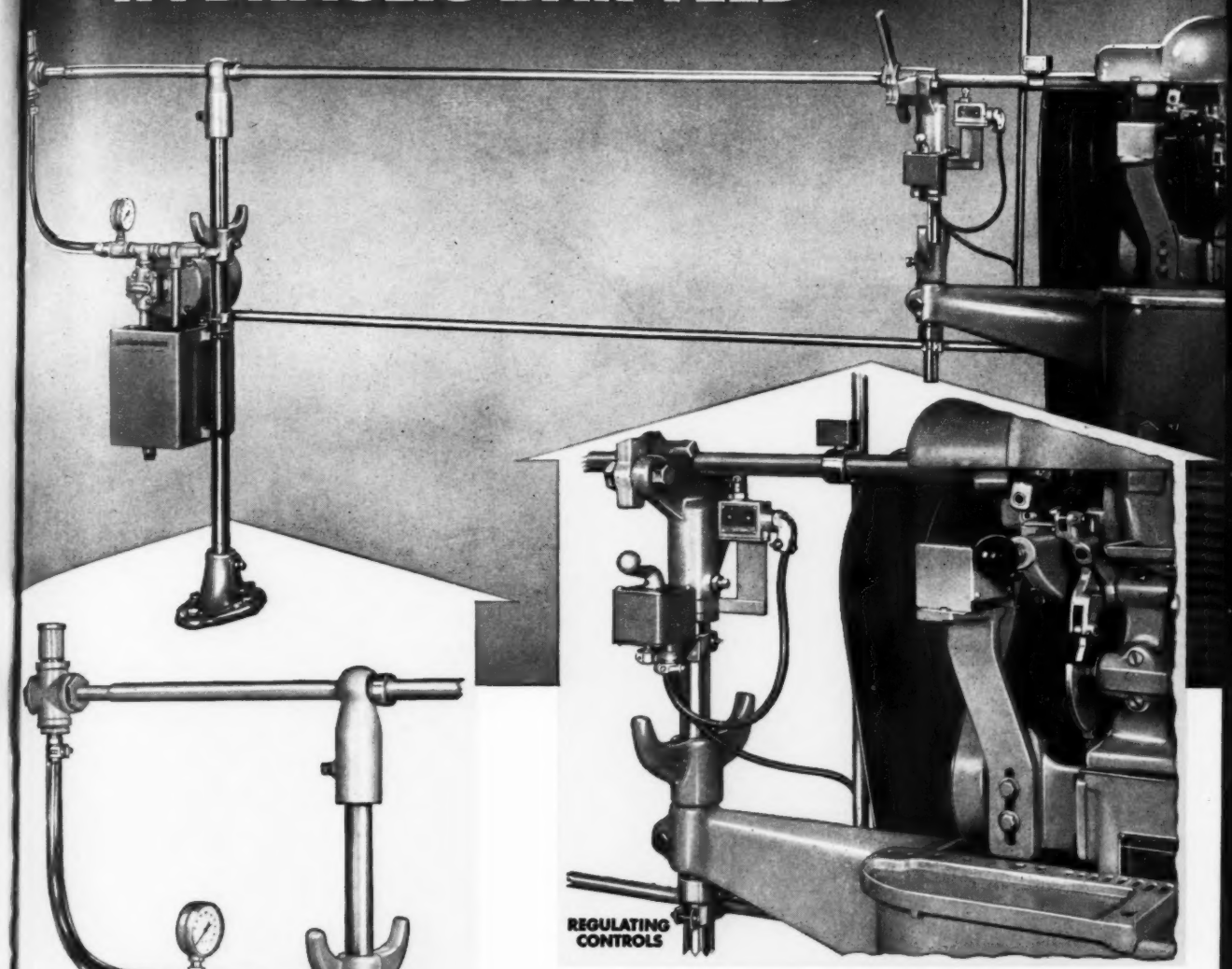

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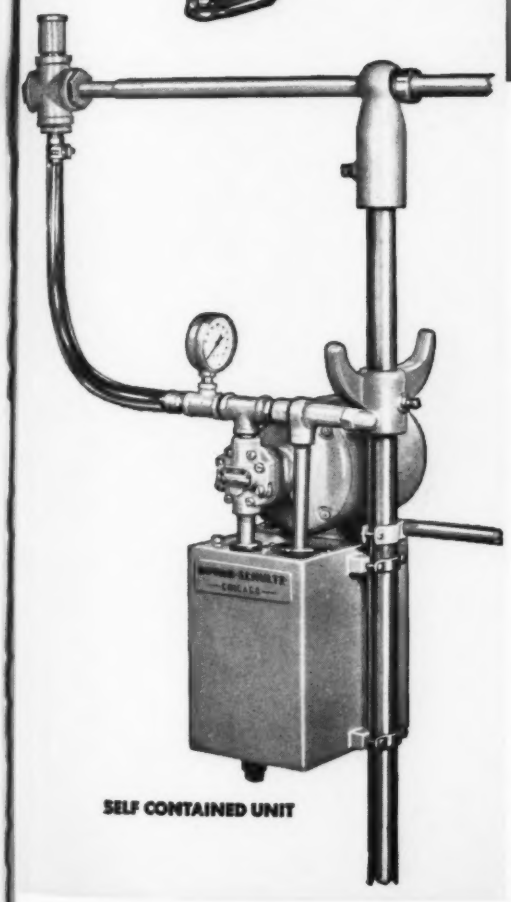

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